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Many requests received from the readers of NATURE MAGAZINE ask the recommendation of books in the various fields of Nature and science indicates an existing demand. This demand is for books that are authentic, practical and worth adding to one's library. It is apparent that it is the duty of the AMERICAN NATURE ASSOCIATION, through these pages, to assist its members by suggesting the worthwhile volumes.

Each month this page will be published in NATURE MAGAZINE. On it will be listed books in two classifications. The first group includes those volumes of current publication regarded by the most competent authorities, consultants of this Association, as outstanding and valuable. The second group includes those books in various fields which are regarded as somewhat standard works and yet are still available from the publishers.

Consider these lists of books, your own particular interests in Nature and your present library, and add an excellent Nature book each month. Send the listed price (which includes postage) of the volume to:

BOOK EDITOR, NATURE MAGAZINE

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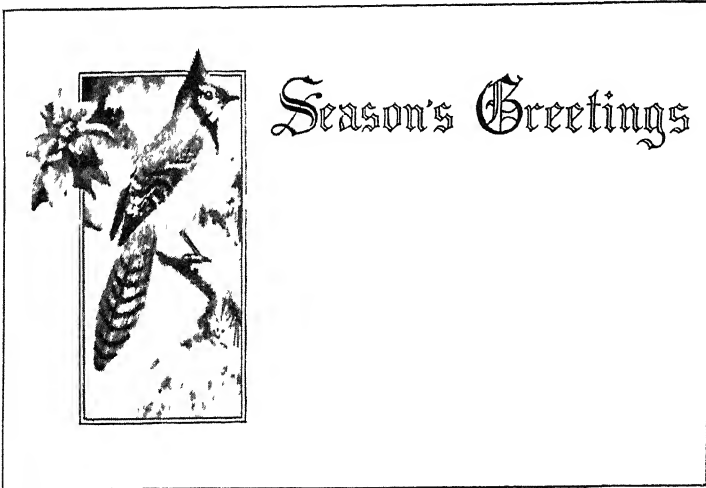
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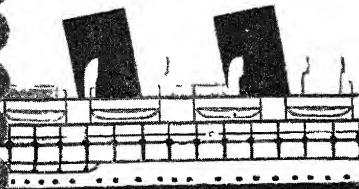
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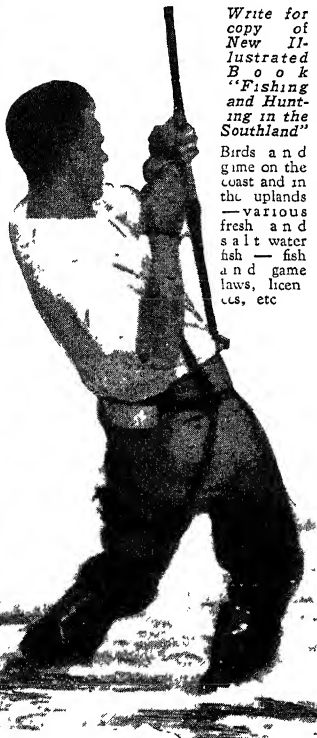
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The days following Christmas are marked mainly by a flurry of travelling, North and South, East and West. A large share of it will be to Europe, for as a winter resort this is growing in favor. In prospect of a busy season, all the leading steamship lines have their best boats ready at the tape to dash across with the beginning of the New Year.

* * *

The White Star Liner *Olympic* makes a trip from New York to Southampton on the eleventh and the thirty-first, and the *Megantic* and *Atiabie* of the same line depart for Liverpool on the fourth and eleventh, respectively. The Red Star line, from New York to Plymouth, Cherbourg and Antwerp, has sailings on the fourth and eleventh. The same dates are also selected by the Atlantic Transport line, from New York to London, for the weighing of anchor of the *Minnetonka* and the *Minnekahda*. Europe is much more pleasant in winter than in summer, if only to escape the crowds, and to travel about with that leisure which the more travelled months cannot offer.

* * *

Among the 'round-the-world cruisers, the *Belgenland*, of the Red Star line, departs from New York on December 20, and leaves Los Angeles on January 5, bound for Hawaiian Islands, Japan, China, the Philippines, Siam, Java, India, Ceylon, Egypt, Greece and Europe. Among the most interesting ports it will touch will be Colombo, the capital of Ceylon. Here, one will find a true Conrad setting, and can easily imagine he sees Lord Jim, or that any one of the passing negroes is the "Nigger of the *Narcissus*". Here are the same sort of sea outcasts of which Conrad wrote, the same type of ships, the same indolent air of the East, the same touches of life more or less burned by a tropic sun. Yet perfect appointments in the hotels, and excellent entertainment at all times, as is characteristic of the Red Star cruises.

* * *

Among the many other desirable cruises offered by nearly every steamship line are the Mediterranean tours of the White Star company. The *Laurentic* departs on January 9, and again on February 27 from New York. The *Adriatic*, which calls at Boston, leaves on January 18. Madeira, Gibraltar, Algiers, Naples, Constantinople, Alexandria, Syracuse. There will be no end of beauty to be breathed in and life to study amid the scenes found along the way. Or one can take the *Homeric* on January 25, and cover the country somewhat more elaborately, thus still further seeping up what the world has to offer.

* * *

The beckoning East can become more convincing to those who wish the advantages of civilization when they travel as a result of the offerings of the Anglo-American Nile and Tourist Company, which is running 20-day tours up the historic Nile to the first cataract, past Beni-Hassan,

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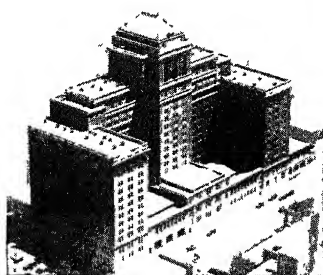
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* * *

The Royal Mail Steam Packet Company, New York, announce that the *Arcadian*, a 19,400-ton oil burner, is to replace the *Avon* on the New York-Bermuda sailings One of the bigger and better boats, her first sailing will bring her into Bermuda for Christmas, while the second, on December 27, arrives before New Year's This same line offers a series of 14-day winter cruises to the West Indies for \$140, on the steamer *Araguaya*

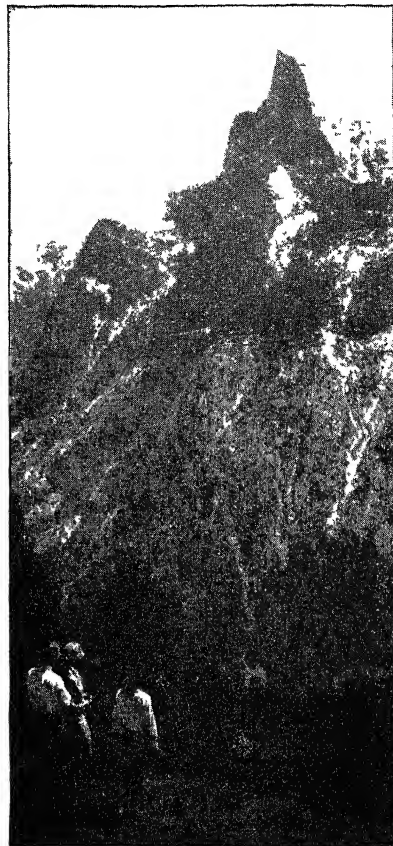
* * *

Florida and North Carolina in the East probably draw the greatest number of Americans during the colder months, and just now all the southern railroads are crowded to capacity Their motto seems to be "Get them all out of New England by Christmas" Bookings to Florida, the Seaboard Air Line Railway reports, were heavier than in previous years The trains of the Southern Railway, whose fleet is one of the largest, are likewise well-filled Among the crack Southern Railway flyers is the Royal Palm deLuxe, with sleeping cars from Chicago, Indianapolis, Grand Rapids, Detroit, Toledo, Buffalo, and Cleveland, all Miami-bound Its rival probably is the Ponce deLeon, while the Skyland Special, running from Cincinnati to Jacksonville through Asheville in the "land of the sky" will probably tempt those choosing the more scenic routes The Southern Railway has in addition several trains from the West, such as the Kansas City-Florida Special From New York runs the ever-popular Aiken-Augusta Special, which takes in both Aiken and Augusta, both favorite wintering places

* * *

Growing interest in winter sports may cut down some of the southern migration in the next few years, and the North come into its own as a resort Any who have felt the thrill of pitching down a steep slope on skis, or swirling over the ice on skates, or doing a double dip with a toboggan will forever after find the life on the beach or on the hotel verandah—yes, and even on the golf-links,—unmspiring The zest for living which comes from a snowshoe tramp followed by a beef-steak dinner before an open log fire in some secluded, snow-banked cabin is never aroused to such a pitch by other lines of endeavor More people each year are finding this out The Adirondacks, the White Mountains, the Berkshires in the East, and the Rockies and Cascades in the West gain each year new friends who like them snow-capped better than bare

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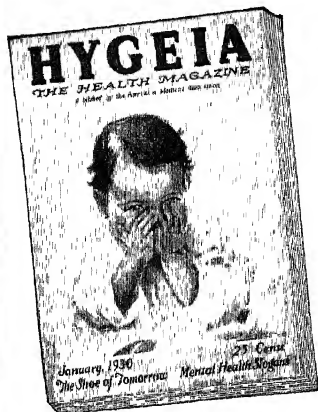
In winter, a week-long holiday of fascinating outdoor sports . . . in spring and summer, the horseback, motor and hiking tours up into lordly High Sierra . . . in autumn, the thrill of Indian Field Days, and sunshiny rambles along the russet-glowing trails. *All year* you play!

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"CITY SMOKE"—A Necessary Incense to Gods of Prosperity?

Of more than passing interest is this subject which deals with the smoke evil in manufacturing cities of the United States. The author tells of the progress made in abating the smoke pall which hovers over our industrial centers. Extraordinary photographs add much to this article.

PLUS THESE FEATURES

The schedule for January HYGEIA includes in addition to these two features a wide diversion of health topics: "Neuritis," "Mental Health Slogans," "The Shoe of Tomorrow," "Rhinitis or Nasal Catarrh," "A Mouse That Waltzed Himself into a Job," "Big Medicine," part two, "Who Says So?," part two, "Health Exams at College," "Simple Lessons in Human Anatomy," "Making Worthy Use of Leisure," "Donald the Strong," editorials, etc.

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Photographic DEPARTMENT



MOVIE cameras were a part of the equipment of members of Nature Magazine parties in Glacier National Park last summer. There were instances, however, when weather or opportunity did not permit getting certain shots and these had to be passed up. The Bell and Howell Company now announces a group of National Park films in the 16mm size which may include shots you missed in one or another of the National Parks. In any event they will supplement your vacation reels. The Parks covered are Yellowstone, Glacier, Yosemite, Grand Canyon, Bryce and Zion.

* * *

Speaking of National Parks, Russell T. Neville, who has contributed to the pages of Nature Magazine, is now lecturing with some remarkable motion pictures taken in Carlsbad Cavern. Mr. Neville is a lawyer of Kewanee, Illinois, but has a flair for caves. He has penetrated caves in his own immediate region, where there are many, and some of his resulting pictures were reproduced in these pages. Taking a DeVry Standard Movie Camera into Carlsbad, Mr. Neville and his daughter, Julia, sought places inaccessible to the public with startling movie results. If you hear of Mr. Neville lecturing, don't miss some remarkable cave movies.

* * *

It's simple but it's good, describes the little idea in the Bell and Howell humidor cans which tells you when the moistening blotter is wet enough. There is a solid circle in the center the same color as a dry blotter. Wet the blotter and it changes to a darker blue, fading out to the color of the center and key circle as it dries. That's really helpful.

* * *

This is the season when those who can seek the tropics or the warmer climes for a bit and Mr. E. J. Butchart, writing of a trip in the Caribbean Islands in the excellent *American Photography*, gives some good advice to the visitor to the tropics who carries along a camera. He writes:

"Most amateur photographers are equipped with folding cameras of the roll-film variety. The most popular size is undoubtedly the 3A or postal card. Films for this size can be obtained in almost every town of any size throughout the islands. The vest pocket sizes, 1 5/8 x 2 1/2 inches and 2 1/4 x 3 3/4 inches run a close second.

"Due to the climate it is not safe to trust to films brought from the north, unless they are absolutely fresh and put up by the manufacturers in hermetically sealed tin or lead containers. However, the best known makes of films can be obtained throughout the islands at prices but little in advance of those bought in the north.

"Film packs of all sizes can be bought in the larger cities, but if the tourist has a



Commander Evangeline Booth

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plate camera of the smaller sizes, he will do well to carry sufficient plates for the entire trip. These will keep for three or four months in this climate, if left in the original packages.

"The problem of exposure is quite different from that encountered in the United States, and the tourist would do well to equip himself with a reliable actinometer and use it religiously at first. The foliage is very dense and in consequence the shadows are much heavier than they are in the United States. Thus the tendency is to underexpose in all landscapes with foliage in the foreground.

"However, on the coast or over water the reverse holds true inasmuch as the light is stronger and somewhat shorter exposure is required than in similar situations in the north. This also is true of the cities, inasmuch as nearly all the buildings are white and the light in the streets is nearly always very intense. This is quite the reverse of northern cities where longer exposures are needed for street scenes.

"Development can be handled much in the same manner as in the north. In the larger cities one can find reliable finishers to whom can be entrusted the task, should the photographer not care to carry an outfit with him. However, let me sound a word of warning against the smaller shops in the cities or in the smaller towns. I know from sad experience that most of them can be depended upon to ruin the most cherished pictures in the lot. A fairly good plan is to mail your undeveloped films back to some well-known finisher in the north. However, it is difficult to do this with plates, both on account of danger of breakage and their weight.

"If the tourist wishes, he can easily carry a tank with him, and do his own developing. This has the advantage that if pictures are lost through over- or under-exposure, the mistake can be corrected next day, instead of losing the majority of the photos of the trip. Personally, I follow the same formulas as in the north, with the exception of using a strong hypo solution, which I harden with a little formalin instead of the usual hardener.

"In conclusion let me say that the photographic opportunities are unexcelled in these beautiful islands, and the careful camera-wielder is sure to return home with a collection that will richly repay his pains."

Help Wanted

In connection with their work on the study of insect parasites of domestic birds and animals, the Bureau of Entomology of the U. S. Department of Agriculture has issued a call for help in obtaining specimens of external parasites of all wild animals and birds, especially the game species. These insects and related forms, including the biting lice, sucking lice, fleas, bird flies, mites and ticks, cause lowered vitality and loss of life. Collectors may preserve the specimens in small vials containing a 70 per cent solution of grain or denatured alcohol or in three per cent formalin. The specimens should be sent to F. C. Bishopp, Bureau of Entomology, Washington, D. C., and the bureau will send small vials containing the preservative to anyone interested in aiding the study.

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NATURE MAGAZINE is published monthly by the American Nature Association.
Entered as second class matter May 31, 1927, at the post office at Washington, D C
Additional entry at Greenwich, Conn

*Subscribing Membership
Blank will be found in the
back pages of the magazine*

Publication and Editorial Office, 1214 16th Street, N W, Washington, D C

Additional Offices of Publication, Greenwich, Conn

ADVERTISING OFFICES

New York—171 Madison Ave
Chicago—Mather Tower Bldg

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Washington, D C—1214 16th St
San Francisco—Hunter-Dulin Bldg
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THE "most senseless and atrocious" slaughter of wild animals that has, perhaps, ever occurred. Thus does at least one Wyoming newspaper describe the killing that attended the six-day open season on prong-horned antelope in certain counties in Wyoming during the past fall. Sportsmen, if thus they be styled, drove in high-powered cars into the herds of animals, shooting them down from all sides. Many of the antelope encountered blood lust in man for the first time. They ran wildly in circles, then attempted escape, only to be mercilessly followed and butchered. Through the streets of Cody, Medicine Bow and other cities flowed hundreds of cars containing the carcasses of these animals, driven proudly by these so-called sportsmen.

It is to the credit of Wyoming that many of the leading papers of the State were eloquent in condemning the affair as a disgrace and a blot. Albeit there was some thought of Eastern disapproval in this stand, the newspapers were sincere in their revulsion of feeling. The blame would seem to be divided between the authorities and those who were willing, in the name of sport, to shoot down these gentle and defenseless animals.

The prong-horned antelope is the sole representative of its family, found nowhere else than in North America, a fact that should be a powerful argument for its preservation. It was once so numerous as to rival in numbers the bison, but has suffered such sad diminution during recent years that fear has been expressed by many well-informed students that its extinction was imminent. A few years ago special efforts were made to ascertain the numbers remaining, and a rather liberal estimate showed approximately 30,000 on the entire continent. Seven thousand of these were credited to Wyoming, a state where fifty years earlier a single valley, the Big Sandy, had harbored as many as now exist in all America.

For about nine years the Game Commission has been authorized to permit the killing of one buck antelope under a special license granted to a limited number of hunters, and in certain counties. The present season is apparently the first time that the privilege has been actually extended, and the

license fee was reduced to \$2.50, while the limitation as to numbers has been removed. This liberality has evidently proved too great a temptation to the sportsmen of Wyoming. We doubt if those hunting under the circumstances noted were always careful to pick out bucks as their victims, and we cannot help wondering how many of the innocent animals were crippled, and left to suffer a lingering death. A most regrettable aspect of the matter is the realization that this beautiful species can suffer such slaughter in one state while efforts are being made in several other states to obtain sanctuaries for its protection. In the present case the ban was lifted ostensibly to reduce certain herds on overstocked ranges, but unfortunately the season was opened in some counties where very few of the animals are left, thus raising a question as to actual motives.

There is, unfortunately, in this country, and perhaps the world over, too much remaining of that instinct to kill that is a part of our savage heritage. Only lately, when its wild victims are about to vanish, has this tendency been revealed in all its hideousness. And now, when realization has come, pitiless commercialism still tells the unthinking that such slaughter is justifiable.

Where then must we place the blame for such sad and disgusting exhibitions as this of the Wyoming plains? It would seem upon mankind in general, whose level of understanding is too often still that of the savage. Nay, lower yet, for the savage killed for food and for clothes to warm him. Our task is not, primarily, to berate the State Game Commission of Wyoming, however egregiously it may have blundered. Ours is to look within ourselves as members of the higher order of animals that we complacently regard ourselves to represent.

Wyoming's slaughter of the antelope is only the instance of the moment. Killing of wild life, less spectacular, perhaps, but equally devastating and enormously greater in volume, takes place annually as the "seasons" roll around. As human beings we must come to a clearer understanding of what is sport and what is plain, blind slaughter. We must arrive at some understanding out of our intelligence, our fundamental rightness, our civilized instincts, and not by the aid of specious propaganda.



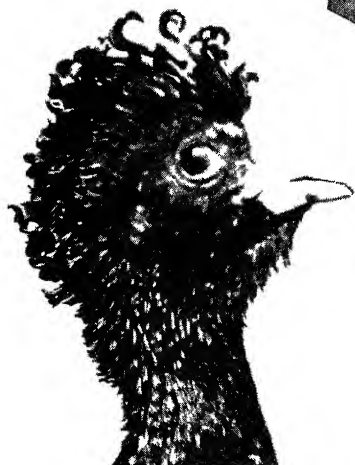
Benson B. Moore

A STUDY OF RED FOXES

*Reproduced from an original drypoint
etching by Benson B. Moore*

Volume 15
Number 1

January, 1930



THREE JUNGLE COMPANIONS
Above mother sloth and babe
snooze, at the left the great Panama
curassow, and at the right is
a black howler monkey looking a
bit belligerent



A JUNGLE LABORATORY

Companions of the Wild at Barro Colorado Island

by Dr. Alfred O. Gross

Photographs by the Author

WHEN the canal builders threw a dam across the Chagres River and created Gatun Lake, the largest island within this new body of water became known as Barro Colorado Island. Rich in the teeming tropic life of a rain forest of the Torrid Zone, this island was set aside in 1923 by the Governor of the Panama Canal Zone as a permanent reservation where natural wild life conditions in the Tropics are to be maintained. On a hill, overlooking the beautiful lake from one side and in the embrace of a primitive forest on the other stands the biological laboratory of the Institute of Research in Tropical America.

In the depths of this great forest, the birds and mammals live a natural life. Yet always they are under the harsh laws of the survival of the fittest in an environment where the struggle for existence is extreme. When man visits this island he becomes a part of its complex animal association. At first there is a mutual distrust but

man soon learns that even the larger carnivorous animals such as the ocelot, the puma and the jaguar are never aggressive. On the other hand, the denizens of the jungle are, with increasing confidence, making frequent visits to the area around the laboratory. Here the birds and smaller animals have discovered a zone of protection. The visiting naturalist may choose to walk the miles of excellent trails cut through the 3,600 acres of impenetrable forest where there are evidences of the presence of the

inhabitants on every hand. Yet if he remains at the laboratory, he will probably see more of them. There every hour brings the new, the interesting and the unexpected.

Dawn comes quickly in the Tropics, and at Barro Colorado the silence of night is suddenly broken by the strange voices and notes of many birds. The little green paroquets, which, like English sparrows, seek out the habitations of man, fly about in wild confusion in the tree tops above

Dr. Gross is well known for varied work in the biological field. He is on the faculty of Bowdoin College, Brunswick, Maine, and in charge of the investigation of the mysterious diseases affecting ruffed grouse in New England. Dr. Gross has also devoted much time to the battle to save the heath hen, now believed to have joined the ranks of extinct birds.



THE TURKEY VULTURE

A quite common bird around the laboratory and not exactly a beautiful fellow in habits or in looks



AN EDIBLE RODENT

Prized by the natives as food, this fellow is often shot by jack-lighting

the laboratory, and awaken the late sleepers with their loud monotonous clatter. Parrots on their way to favorite feeding grounds fly overhead in pairs, announcing their presence by loud piercing shrieks. In one of the tallest trees in front of the building is a splendid colony of oropendulas, large, beautiful birds marked with rich brown, black and yellow. They have built long pendant nests which are suspended from the topmost branches, swaying in every breeze. The gurgling liquid notes of these oriole-like birds are always an important part of the morning chorus during their nesting season. As one looks out through the opening towards the lake there is a constant procession of birds passing from the jungle of one side to the other. Toucans, with their enormous and grotesquely colored bills, labor across the space like overweighted airplanes. Flycatchers, with brilliant yellow breasts, perch on the tops of the giant banana leaves, where they are ever on the alert for every passing insect. Beautiful iridescent hummingbirds sparkle in the morning sunshine as they hover about the flower-



THE SHORT-KEELED TOUCAN

It staggers under the Latin name of Rhamphastos piscivorus brevicarinatus

covered vines which cling to the great trees. As one surveys the jungle margin with a pair of powerful field glasses he is impressed with the large number of birds which may be seen flitting in and out of the dense foliage.

Often you may see troops of monkeys, which, in passing, linger in the tree tops, perhaps out of curiosity for the queer human inhabitants of the station. Their challenging, roaring cries reverberate through the jungle and remain long in the memories of every one who is fortunate enough to hear them. One afternoon when a troop of these black howlers went by the laboratory, a baby monkey was separated from its parents and left all alone in the top of one of the trees. It was rescued by the keeper and added to the interesting group of station pets. During the summer of 1927 a family of night monkeys occupied

a hole in a tall tree which overlooked the laboratory. Without doubt these frail little fellows had sought out this place near us because of the protection it gave them from predaceous animals that shunned human habitation. At daybreak we could see them coming home from their night roving to sleep for the rest of the day. One morning their daily routine was interrupted because, during their absence in the night, a porcupine had decided to take the monkeys' bed for his own. They were powerless to remove this living pin cushion and after an indignant protest disappeared into the trees. They were deprived of their home only temporarily, however, for Donato, the Indian boy, climbed the monkeys' llano and removed the spiny intruder. This porcupine differs from our northern species



ADULT COATI OUT ON A FOOD HUNT

These animals frequently come to the clearing about the laboratory for food and without fear

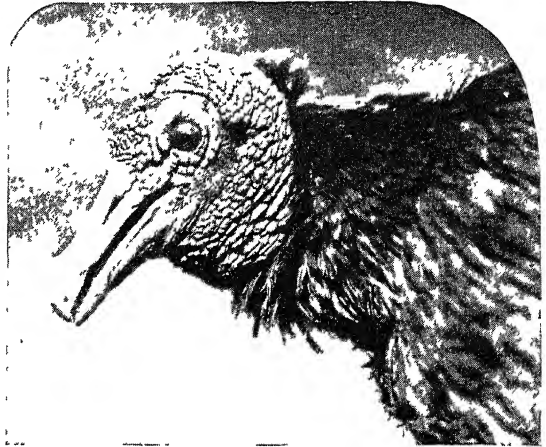


LOOKING OVER THE LABORATORY

This is one of the black howler monkeys who make themselves heard in no uncertain terms as they go through the trees

in having a prehensile tail which enables him to cling with greater ease to the branches and vines of the forest. Furthermore, this species does not have a heavy coat of hair between the quills. The climate makes such a covering superfluous.

One of the strangest of all animal companions at Barro Colorado is the sloth. It lives its whole life upside down. Instead of walking on all fours he clings to the underside of a limb and normally crawls, eats and sleeps in this curious position. There was an armadillo who lived in an excavation under the board walk in front of the laboratory. The results of his digging industry were plain evidence of his presence, but it was only on rare occasions that he ventured out of his subterranean home. In spite of his heavy armor he was active and it required no little effort to capture him when we desired to examine him at close range. If left alone, he would explore about the vegetation, offering us excellent opportunities to observe his curious behavior. Another animal which appeared not infrequently was the coati. These rather large carnivorous animals are well able to compete with others of the jungle and did not come to the station for protection but rather to secure choice bits of food. They are especially fond of bananas. In fact, bananas proved too much of a temptation for one large male which was coaxed into the building by means of a trail of small pieces. Mr. Coati had the surprise of his life when the spring door banged behind him. He was held



PORTRAIT OF A BLACK VULTURE

He is always on hand when there is a feast on the carcass of some victim of the jungle

prisoner for a few days, literally stuffed with all kinds of tempting food, and then allowed to go on his way to join his fellows.

Since the laboratory was built, a little finch-like bird known as Hick's seed-eater has found the small clearing in front of the buildings, a hospitable place to live. These finches are characteristic of the great savannahs and cultivated areas. They are not a jungle bird but here is an isolated spot where they have found a haven of protection. They find here not only food but a safe place to build their nests and to rear their young. The males are black with minor markings of white, whereas the females are modestly dressed in a dull clay color. They are hearty, adaptable little creatures with a pioneer spirit which has made them one of the most successful species in the tropics. Their sweet concert singing in the early morning as they sway on the long rain-dripped grass stems is one of the pleasant experiences of the day. These birds are especially in evidence during the month of October, when seven of their nests have been found in the shrubs and small trees of the clearing near the station.

Many birds make their permanent home in the Tropics and some may spend an entire lifetime on a restricted area such as Barro Colorado Island. But others found there during the winter months migrate to the north to build their nests and to rear their young. During the months of September and October many of the familiar bird ac-



NEST OF WAGLER'S OROPENDULA

One of the many interesting nests built in the colony near the laboratory



AN ANTEATER OUT FORAGING

It approaches a small termite's nest in search of its favorite and principal food



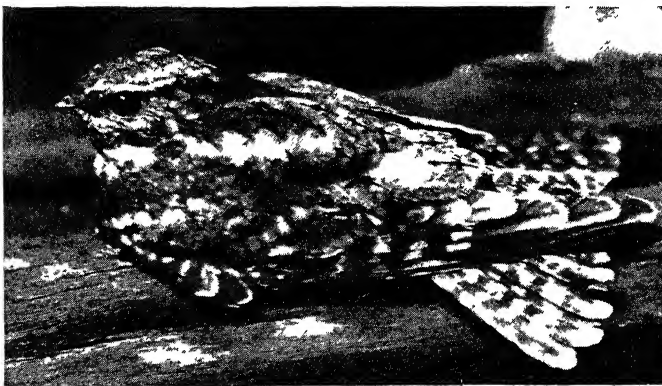
A HOME IN THE TIP
OF A PALM LEAF
*The nest of the Nicaraguan hermit, a species
of hummingbird*

"RADIO", PET NATIVE
DEER AT THE
LABORATORY

*This is a portrait of a
fully grown adult male
of this species*



quaintances of the north appeared in this environment where they seemed much out of place among the palms and other tropical vegetation. Great flocks of night-hawks were seen during the latter part of September. Some of them flew high, winging their way to winter homes still farther south; others lingered and repeatedly circled about the clearing and over the lake to capture some of the many insects always to be found there. One morning a nighthawk unexpectedly swooped down and alighted on an old log directly beside us. It seemed tired and somewhat bewildered, but still allowed us to take



A NIGHTHAWK DROPPED IN FOR A CALL

Many familiar birds coming south for the winter were seen at the laboratory and were like old friends to those from the North

several pictures at close range before flying. How interesting it would be to know the story of this welcome visitor. Where did it nest? Was it successful in rearing a brood? What were its most thrilling experiences in its long flight of thousands of miles in coming to the

Tropics?

On another day a little yellow warbler appeared in a papaya tree just outside of my laboratory window, carrying my thoughts to a pair of these birds which nest each year in a certain honeysuckle bush at Brunswick, Maine. In October a spotted sandpiper was seen on a clay ledge along the lake. How good it was to see his teeter and

hear his sharp piercing calls again. Almost every day during the late fall brought hosts of migrating birds. At one time the trees in the ravine at the right of the laboratory were literally alive with kingbirds. It was a strange sight to see them side by side of their highly colored cousins in an environment totally different from the old orchard they left behind in New England.

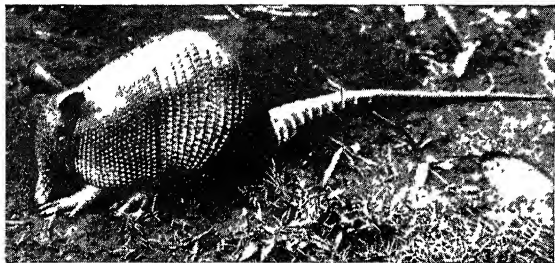
We had many interesting and strange companions at the jungle laboratory but none of them thrilled us more than these old familiar commonplace bird friends from home.

One might spend years on Barro Colorado Island and yet see but a small part of its interesting life. There are few places of equal area in the world where such a wealth and diversity of animal forms can be found. The insular isolation has been an important factor in the concentration and preservation of this life and this feature has also contributed to making conditions ideal for working out certain biological problems. On this Island the

A TWO-TOED SLOTH QUITE COMFORTABLE

These peculiar animals live a decidedly upside down existence because they like it





AN ARMADILLO
This one lived under the walk at the laboratory, always an interesting fellow to meet and to study



THE MARMOSET OR SQUIRREL MONKEY

The most interesting and curious of jungle companions

CLOSEUP OF PORCUPINE
This shows well the spiny coat and the prehensile tail



life history study in the tropics

One would have to travel a long hard journey to the interior to meet with similar primitive conditions and yet from the door of the laboratory on Barro Colorado you may



A COMMON GREEN LIZARD

Note the length of the tail in this species

see the ships of the world pass in review and all too frequently hear the roar of an aeroplane passing overhead to remind you that you are near civilization.

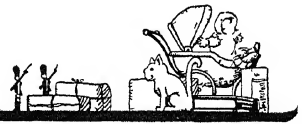
Lovers of tropic Nature are indebted to the men whose foresight revealed the possibilities of Barro Colorado and whose persistence persuaded the Government to set aside this Island Ark as a permanent reservation where our companions of the jungle may continue to live their lives unhampered and unharmed by the constant greed of man.

The issue of Nature Magazine for February will be one of varied appeal, from the leading article on hunting the mountain tabby cat with a movie camera to a little story about a snail as a pet. That issue will include another fascinating story by Charles Fitzhugh Talman, who has been missing from our pages for several months. He writes about the Gulf Stream and what it does. Ben Hur Lampman appears again with one of his appealing stories, this time about a murre named Skipper. Lewis Radcliffe of the United States Bureau of Fishes tells how to go farming in the water. A Brooker Klugh writes about the speedy little subway digger of the forest, the short-tailed shrew. C F Greeves Carpenter suggests a novel hobby by telling how to raise insects. Another biography; this time about Dr Leland O Howard, one of the most interesting figures in our scientific world today. That is not all, either, for February



SIX MILLION CHRISTMAS TREES

by ALBERT A. HANSEN



AFTER the mistletoe has been hung with due ceremony, the stockings arranged in order along the mantel over the fireplace, the wreaths and bits of holly put in their proper places and the most important object of all—the Christmas tree—gayly festooned with glittering tinsel and decorated with bright trinkets and presents, have you ever, while resting and surveying the final effect of your decorative ability, wondered what sort of a tree was glorifying your Yuletide and where in the world it came from? Or possibly you have been asked embarrassing questions along this line by the youngsters!

If you live in the country of course the answer is easy,—you went into the woods and cut a wild cedar, pine or hemlock or possibly indulged in the popular but reprehensible habit of topping a hemlock of near saw-log size. But if you are a city dweller who must purchase his Yule tree, what is the best kind to get? What choice is being offered?

The answer depends very much upon the section in which you happen to live. The aristocrats of Christmas trees are the firs on account of their excellent pyramidal shape, beautiful deep green hue and soft, fragrant, persisting needles. The

firs can usually be recognized by the fact that the flattened leaves are arranged in two rows on the horizontal branches, due to the twisting of the leaf base. Each needle is shiny dark green above and except for the prominent mid-rib, is silvery white underneath, due to the multitude of breathing pores on the under surfaces.

The species of fir available vary with the locality, but the most popular kind offered in the East is the balsam fir, the bark of which yields the well known Canada balsam used in medicines and perfumes. In the southern states the Fraser fir or she balsam, very similar to the northern balsam fir, is common on the market, while on the Pacific Coast the favorite is the handsome white or concolor fir, a species that frequently graces Eastern lawns as an ornamental.

Competing with the firs for Christmas popularity in the eastern states are the spruces with their scattered, four-sided needles that seem to point in all directions. Spruces are frequently confused with pines but they may be easily distinguished by the fact that pine leaves always occur in groups of from two to five, while spruce leaves grow singly. Most of the usual Christmas pines and firs also have much longer leaves than the



WHAT DECORATED TREE COULD IMPROVE ON THIS?
A silver fir points its spire to heaven on Christmas morning from amid its snowy decoration



WHENCE COMES THE YULE-TIDE CHEER
A common variety of red spruce in the East, growing on waste land useful for little else

spruces offered for sale. On the big city markets of the eastern seaboard the black and red spruces predominate, but these two species to a large extent give way to the less desirable Norway spruce in the Middle West. The black spruce, the wood of which is used in violin making and the twigs, formerly, in spruce beer, has short, thick, pale, bluish-green leaves, while the foliage of the red spruce is slender and of a dark-green or yellowish-green cast.

The firs and spruces comprise the best grades of Christmas trees. The less expensive kinds are usually pines or hemlock. In the East the white pine with its needles in bundles of five, in the South the scrub pine with needles in pairs and in the West the well known lodgepole pine are the principal species. Hemlock can be recognized by the short flattened leaves arranged in two rows with a pair of prominent white lines on the under surface of each leaf. Although this tree will do in a pinch, it is among the least desirable of our Christmas trees as the leaves soon begin to fall and mess up the floor.

The firs, spruces and pines from the New England forests and the Appalachians in the East, the northern waste lands in the Central States and the mountainous regions of the Pacific hinterland supply the bulk of the Christmas demands but there are a number of minor species of considerable importance that should not be overlooked. It is by no means uncommon to find *arborvitae*, a familiar ornamental species, with flattened, scaly foliage, offered among the better class of trees, and the common red cedar or juniper, source of cedar chests, fence posts and matches, sold among the less expensive offerings. Almost any species of evergreen that thrives locally may be pressed into service to gladden the hearts of the youngsters during the Christmas season. Even juvenile specimens of the famous giant Californian redwood may do their share toward spreading Christmas cheer.

There is an entirely different class of Yule trees,—live specimens purchased from nurseries to be planted in the open as living reminders of the season of good cheer. This is a new and wholly delightful custom, caused by high prices, the rapid growth of the conservation attitude toward wild trees and an increasing

desire for beautifying home surroundings. Although wild specimens dug out of woods and fields,—with the permission of the owner, of course,—may be used, they are more difficult to handle, less attractive and far more fragile of life than nursery-grown plants. The latter are usually supplied with a ball of earth around the roots on which an overcoat of burlap has been fitted. The burlap-covered ball of earth may be set into a tub or directly on the floor and the burlap hidden with colored crêpe paper. When the festivities are over, the tree may be maintained in a thriving condition by merely keeping the soil moist until the ground has thawed out sufficiently to permit the digging

of a hole for its reception. There is no need even to remove the burlap which soon rots and is easily penetrated when root growth is resumed in the spring. The chances for successful transplanting are excellent and the little Christmas tree will soon grow to robust proportions, with its value constantly enhanced by the pleasant memories it inspires and by its ever-increasing beauty.

There are a number of attractive nursery evergreens well suited for the rôle of live Christmas trees that may be had at prices suited to almost any pocketbook, the choice ranging from a modest outlay for the Norway



A FAVORITE CHRISTMAS TREE

The cedar is handsome in any room, as thousands of happy children attest each season

spruce and a medium expenditure for the white or concolor fir to a lavish disbursement of from twenty to thirty dollars or more for the expensive Colorado blue spruce or Koster spruce. Both the Colorado tree and its Koster variety are noted for the beauty of the striking light blue new growth that appears each spring. The white fir has so many good points as an ornamental that it may well be considered the best of the firs for landscaping purposes. It is hardy, of rapid growth, and can withstand both heat and drought. The cheaper Norway spruce is probably the most familiar of planted spruces. It develops rapidly into a large, handsome tree with drooping branches that may be grown alone or for windbreaks. On account of the distinct tendency toward natural pruning, however, the tree becomes somewhat scraggly in appearance on maturity.

A question that is brought up every Christmas season by the conservative conservationists is the restriction of the use of trees in the interest of forest conservation. It is true that in order to meet the annual demand somewhere in the neighborhood of six million trees are needed but when the facts are looked at in proper perspective no one need hesitate in celebrating the Christmas season by a custom that has been handed from generation to generation since the days when our pagan ancestors gathered around the blazing Yule log. In the first place, most of our Christmas trees are the result of thinning heavy stands of evergreens that are actually improved by this process. Nature, you know, is so lavish that there are practically always more trees present than can possibly mature. The proper thinning out of the smaller trees gives the rest a better chance to become lumber, railroad ties, fence posts, chests, matches, pulp-



THE KING OF THEM ALL

From one coast to the other, the white fir is recognized as the finest of all the Christmas trees

wood and other products of the forest. Furthermore, a large proportion of the trees found on the Christmas market never came from the forest, being the product of waste land of too poor a quality to be cultivated with profit and entirely unsuitable for merchantable timber-growing. Again, the growing of trees for the Christmas trade is an industry that is increasing in proportion. We need have little fear,—consider the European forests that have supplied Christmas trees to the children of Germany, the home of the beautiful custom, and other countries for untold generations without the slightest apparent harm.

Although wise foresters have no sympathy with the joy-killing and ill-informed conservationist who advocates a treeless Christmas, they

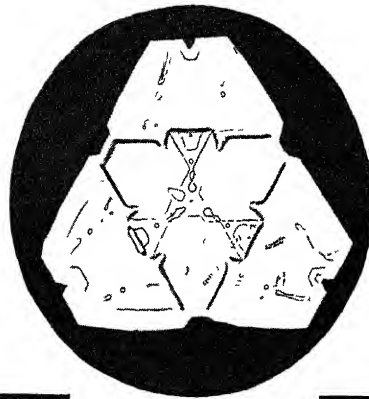
are heartily in accord with the movement to regulate the trade to prevent the annual waste represented by the wholesale destruction of trees to bolster up the prices on overstocked markets, a waste that has been estimated during some seasons to reach the appalling total of twenty-five percent of the entire supply. There should be some way of ascertaining market demands or else of disposing of the surplus to needy families that can ill afford to buy their own trees. There must be many families without the cheer of Christmas evergreens, and truly, what is Christmas without the decorated tree in the corner aglow with the lights and gleaming with be-ribboned presents? It is one of the most beautiful symbols of Christendom, and every home should have one. Instead of 6,000,000 let us have 30,000,000 Christmas trees,—one for every family.

Let the season that celebrates the birth of Him who loved little children bring to each house where children dwell the decorated tree that means so much in their lives.

THE most recent expeditionary activity of the American Nature Association under the leadership of our President, Mr. Arthur Newton Pack, and William L. Finley, led into the rough land of Arizona in search of motion pictures of mountain lions. This adventure, filled with hardships, was finally crowned with success, and the story is told as the leading article in the February issue of Nature Magazine, with illustrations from pictures taken on the trip.

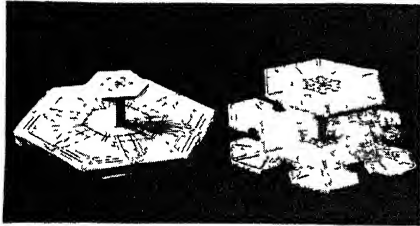
SNOW FLAKES

by Constance L. Lyon



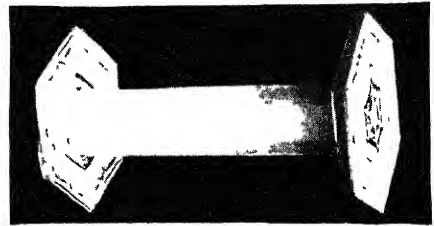
In the Making of
Which Nature Shows
Her Greatest Artistry

Illustrated with the
Photographs of
Dr Wilson A Bentley



MARVELS OF JACK FROST—ARTIST

*Above the snow flake
Masonic emblem, at
the left the wondrous
cuff-button and at the
right a "bobbin"*



IT is to a farm boy's love of the snow flake that science owes its knowledge of these gems. The child's interest was born on the memorable day that brought him a microscope. Then he entered fairyland, and began to peep at Nature's hidden treasures,—the wing of a butterfly, a bit of moss, and many a strange little insect. But it was winter that brought him triumph, because then he caught a snow flake. Its beauty fascinated him and set his heart pining with desire that all the world might see it as he saw it. Longing led to dreaming dreams that were to come true, because his mind hit upon a way to photograph snow flakes.

Boylife, he said nothing about it, only pleaded for a camera and a powerful magnifying lens, a lens that would magnify many thousands of times. Christmas brought both. In a few weeks, lens fitted to the camera, he was ready to photograph snow crystals magnified three thousand six hundred times. A workshop outdoors, where the temperature would stand at freezing, was quickly built.

The first snow flurry saw a board covered with black velvet placed invitingly in the open air. A snow flake fell lightly to rest. The boy darted forward. Holding his warm breath lest the crystal melt, he seized a sharp-pointed stick, and with a light, sure touch gently lifted the crystal from the board to the camera slide. In the twinkling of an eye a single snow flake evaporates, but he snapped the camera in time.

Today that boy is Professor Wilson A. Bentley, authority on snow flakes, and the pioneer of snow crystal photography. He still uses his early methods, still uses the same camera and lens.

"I can't remember the time I didn't love the snow

flake more than anything else in the world," he said, as he told me the story of the snow crystal's life.

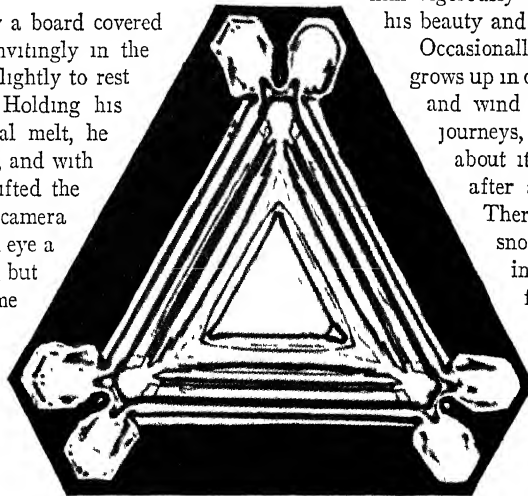
When Jack Frost is about, Nature says, "I shall now create two different kinds of snow flakes. I shall use my daintiest material, invisible water atoms, for snow flakes marvelously beautiful, but for the other sort I'll just give Jack Frost some of the coarser visible cloud vapor, and tell him to freeze it into plain little pellets, and toss them to earth."

The lovely variety, the crystalline, Nature sends us in almost every snow storm. Sometimes these snow flakes arrive in armies of trillions upon trillions, at times flying all bunched into one big flake, and at other times singly.

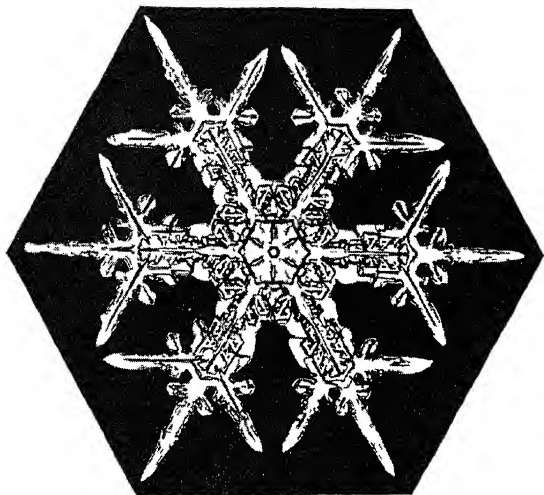
The unbeautiful, the granular variety, are wee snow balls, about the size of granulated sugar. Frequently while an exquisite crystalline snow flake is traveling on an earthward journey it is attacked by these mischievous granular snow balls, who snow ball him vigorously and sugar him all over until his beauty and shape are lost.

Occasionally a snow flake is born and grows up in one cloud, but more often storm and wind carry the tiny thing on long journeys, and as the crystal is buffeted about it adds to itself one new form after another.

There are many collisions among snow flakes while they are traveling, but Nature often provides for her injured little ones, and crystallizes them over again into new and perhaps even more beautiful and curious shapes. Sometimes she creates a variety known to science as "cuff buttons", or "bobbins". These first are called "compound crystals", and are made up of two dif-

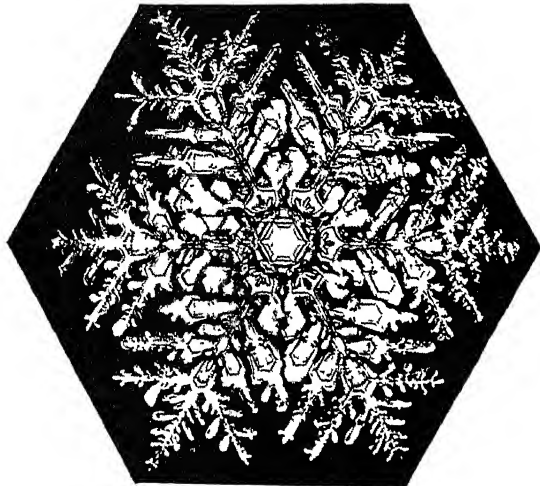
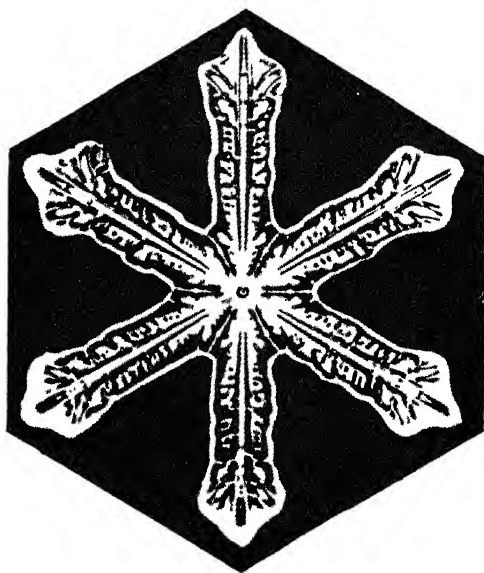


A FLAKE THAT SIGNS ITSELF "THREE"
*Most snow flakes are six-sided but here is one of
the rarer variety*



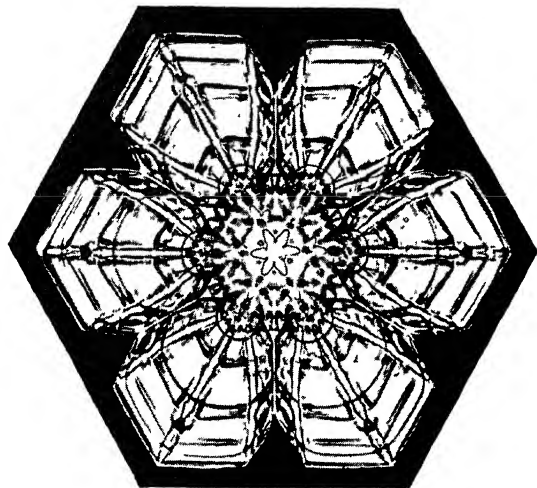
A DIAMOND PENDANT

At the right a star fern, and below, another fernlike flake



A LOVELY DESIGN

Flake below like a spider web, a rare one at right

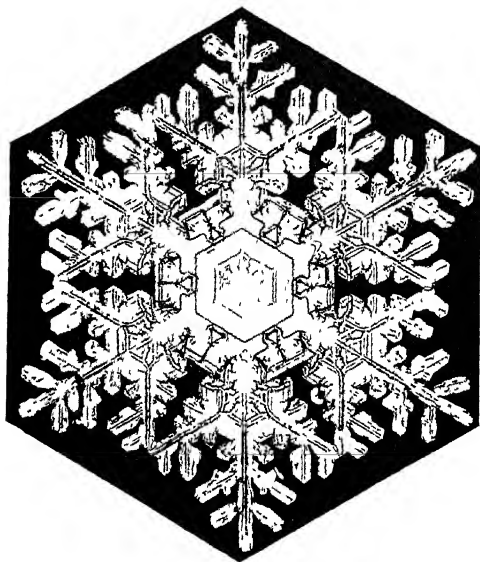


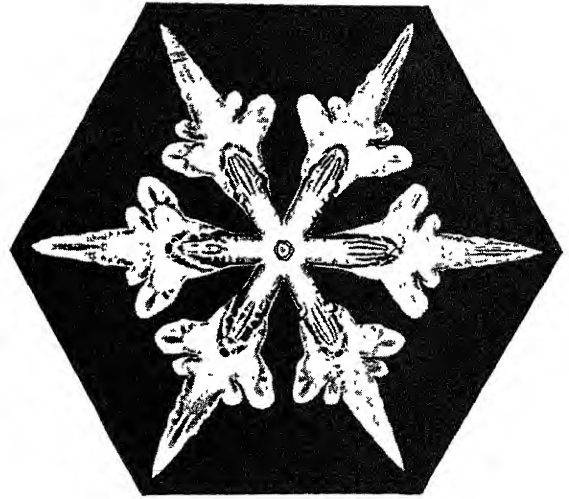
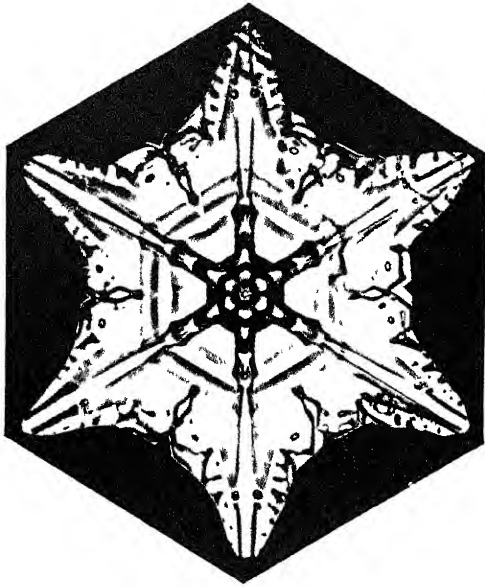
ferent kinds of snow flakes To make them, Nature catches a flake that is long and shaped like a tiny column, and attaches to each end a flat crystal.

And the longer ones, the "bobbins"! Dainty air-jeweled bobbins whereon the fairies must wind the mist and weave the stuff that dreams are made of! Or are they really sun-dials? Imagine fairies keeping tab on the sun in cold cloudland!

Some of these compound crystals have four wings, all standing out stiffly at right angles They are "the four-winged butterfly" variety, and fly in zero weather from very high clouds

The little snow-travelers that kiss our cheeks on a winter day are usually minute six-pointed snow-ferns, six-pointed stars, or like tiny six-branched pine or fir trees Some take the form of a conventionalized six-petalled flower, while still others are just solid blunt-pointed hexagons So, because its usual number of sides





THE STAR FLOWER

Below a feathery flake with a star form at the left

or branches is six, and its angles are exactly sixty degrees, science declares the snow flake has a "signature", and signs itself as "six". However, a few snow flakes that arrive upon rare occasions from very distant clouds should sign themselves "three", for they have only three sides, being triangles

If you look at a snow crystal under a microscope you will discover on the crystal's fragile surface most exquisite designs. They are traced by unbelievably minute hollow tubes filled with air. Glistening in the prismatic colors of the rainbow, or perhaps throwing dark shadows which lend depth, they add greatly to the crystal's frozen beauty. Let your imagination run for a minute: all this is in the space of but one-tenth of an inch in diameter, for that is the size of the average snow flake.

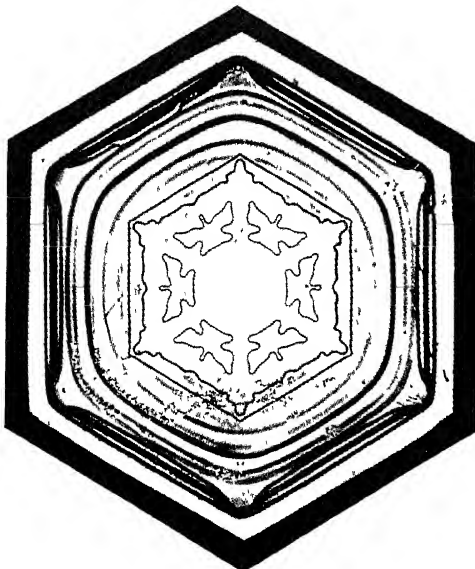
No two snow crystals are shaped or ornamented ex-

(Continued on page 57)



MARVELOUS FLAKES

Note the air tubes in the one below. At the right a solid





HAIL TO THE DESERT ASTER
Superlative one of all western composites, its lavender rays and yellow center make gay the desert

THE desert, from May to December, is as drab as a Labrador Island, or a sand-shoal far out to sea. All annual plant life lies dead, and often has utterly vanished. Bare sand and gravel bake in the sun, with hardly a growth of cactus or creosote-bush to relieve the unending monotony. Those who see it then wonder at the waste and desolation. But they should come here in the late winter months, when the desert puts on its flower show.

It is worth an entire trip across the continent to behold the "waste places" of southeastern California and western Arizona when they are in bloom. With unending stretches of dancing color, they become a mighty greenhouse of Nature with a vault of blue for the dome.

These wonderful desert "wild flower shows" come only occasionally, however. There must be early winter rains in at least fair quantity to bring them. Usually two to four years intervene, and even six or seven years have been known to pass with no more than a few scattered flowers to relieve the dreary sameness of the sandy barren. But no matter for how long a stretch the flowerless years may run, when the early winter rains do finally come in sufficient quantity, the desert riots in endless floral life.

Nor need much rain fall. Elsewhere in our country, "a sufficient quantity" would be considered as a very scanty rainfall indeed, and the period in which it came would be reckoned as "a long dry spell." Three or four

AN ACTOR IN THE DRAMA
The desert satin star never fails to add its note of beauty to the lavish display of the Southwest

WHEN the DESERT BLOOMS

Its Glory Comes with the Rains

by Francis M. Fultz

inches is a liberal allowance, and if the amount be five or six inches, the season is accounted exceedingly wet.

Then the miracle happens—and miracle it seems to many, for whence come the seeds to cause such display? The answer has long been a source of lively discussion. Desert-dwellers are quite generally agreed that the seeds lie in the ground from one season of flower profusion until another of sufficient rainfall comes around. They are probably right, for the vitality of many seeds will endure for a score or more years, when deeply buried, or when protected from moisture. Again, these desert plants are marvellously fecund. Single plants of the more common species,—such as the white evening primrose and the sand verberna,—produce thousands on thousands of seeds. No matter how dry the season, there are always a few specimens of the different sorts scattered here and there,—perhaps under some shrub, or



in the lee of a sand dune, or along the washes. They may be dwarfed and stunted, but nevertheless each of them is likely to produce enough seed to cover an acre with flowers in a favorable season,—and the desert winds take care of the distribution.

Flowers of many kinds enter into this decoration of the desert, but the great fields of solid bloom are made by annuals, and these largely of two or three species. The two which predominate are the so-called sand verbena, *Abronia villosa*, and the desert snow, or white evening primrose, *Oenothera tricholix*. A third, but less plentiful, is the desert sunflower, *Helianthus tephrodes*. Indeed, this latter one does not compare in abundance with the other two. A few more may occasionally enter into the mass display, but no one of them is apt to make more than a local spread of color where it grows by itself. Among them are several species of the evening primrose family. Many are flowers of beauty and distinction, worthy of many pages of description, or better still, of being seen.

The sand verbena is perhaps the greater actor in the drama of desert bloom. Its reclining, vine-like stems cover the sands for league after league with a low tangled mat that is solidly overspread with reddish pink. The stretches of brilliant color are often unbroken for miles, except perhaps by an occasional shrub, and glow with vivid brilliancy under an unclouded sun. The display is incomprehensible to one who has not seen it, and indescribable by one who has. While it lacks the soft, soothing effect made by the evening primrose, and doesn't please as well under close inspection, it has other qualities which compensate for any lack in these respects. Moreover, it has a longer season, prospers under more adverse conditions and its exhibition extends through the twenty-four hours of the day.

Yet, to many, the evening primrose is the desert's greatest flower. Its soft, gray-green foliage blends so harmoniously with the general tone of the desert that it seems especially designed by Nature for the place it occupies. Its territorial distribution is much more extensive than that of the sand verbena, but its plants are seldom so thickly-set on the ground, and in the earlier stages of their growth they often seem quite lost on the wide expanse of sand. But they are rapid growers, are of a low spreading habit, and have a generous supply of large leaves, so in a comparatively

brief time they hide the naked sand over great areas.

This plant is an evening bloomer. Its flowers are three or four inches across, and almost pure white. They live but a single night, fading early in the day following their opening, and taking on a pink tint as they wither. So prolific in bloom, however, is the primrose that each succeeding night finds its fields a spread of snowy whiteness.

The sand verbena and the white evening primrose are very tolerant of each other's company, and the red-and-white combination is not at all uncommon. In the early morning, before the white evening primroses have begun to fade, such mixed fields are exceedingly charming. The tone is more subdued than is the solid spread of reddish pink made by the sand verbena alone, and livelier than the evening primroses themselves ever become.

The traveller may occasionally see the desert brilliant with these two favorites from the car windows of the Southern Pacific trains passing through southwestern Arizona and southeastern California,—especially in the region along the Salton Sea in the Golden State. The more extensive stretches lie some little distance away from the railway. They are easily reached by automobile, however, as at the time the flowers are in bloom the desert roads are usually in very good condition. The highway between Palm Springs and Indio, California, passes through one of the larger garden plots.

The stretches where the desert sunflower riots are yellow, as are all those on which grow any member of genus *Helianthus*. They are neither very common nor extensive and they do not present a solid spread of color. But the plants are slender and upright, and knee-high or taller, so there is always a waving motion when the wind blows,—which is pretty much all the time,—and a consequent changing of tone and tint.

Of the many annuals which here and there add a bit to the decoration of the desert, but which nowhere present wide patches of color by themselves, there may be mentioned the five-spot, *Malvastrum rotundifolium*, spectacle-pod, *Duthyrea californica*, desert cotton, *Baileya pauciradiata*, morning bride, *Chaenactis fremontii*, desert star, *Eremastrum bellioides*, chylismia, *Chylisma scapioides*, and at least a score of others, among which are two or three small-flowered day-blooming members of the evening primrose family which are indiscriminately known as "sun-cups" to the natives.

THE SUNFLOWER

Endless waves of yellow
spring up when rains call it
in bloom

FLOWER OF NIGHT

Just one plant of the evening
primrose, most prolific of
desert growers





WHEN SOUTHERN CALIFORNIA BURSTS INTO LIFE
Dead, drab, barren from spring to winter, the desert garbs itself
in splendid beauty from December to May

The five-spot and the spectacle-pod are true desert plants. These are among the most widely-distributed of all the annuals. With its dark-wine or red blotch at the center of each of its five light-lavender petals, the five-spot is certainly well and appropriately named. I have seen this marvellous flower in almost every section of the Colorado desert and in many parts of the Mojave, even on the floor of Death Valley—that *ne plus ultra* of desolation. The spectacle-pod, that little "cross-bearer" which has its seed-pods shaped like a pair of nose-glasses, seems to have just as wide-spread a bloom.

Within the canyons of the desert mountains are found other species of annuals, which, because they must have a greater share of moisture, do not venture out on the level desert wastes. Of these, the desert satin star, *Mentzelia involucrata*, is easily the queen. Of the blazing star family, it upholds the traditions of that group for distinctive form and attractive qualities. Its satiny flowers are not equalled in all the desert flora in exquisite texture and dainty tinting. Painted Canyon and other gorges in the mountains north of Mecca, California, are its favorite dwelling places.

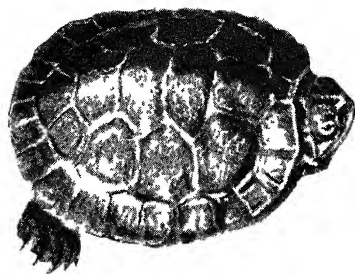
In the canyons just mentioned is also found the desert aster—superlative one of all western composites bearing the much-used name of "aster,"—lavender-rayed, with yellow center, and two or three inches across. And with just enough irregularity in form to give it an air which we can only satisfactorily describe as *chic*. It is a perennial, with a low woody base, a generous annual growth of slender herbaceous branches, and a liberal dower of foliage. The botanists call it *Xylorrhiza* and try to make several species of it,—basing the distinctions upon some slight differences in the form of the leaves. I have seen it growing in various places from

Nevada to Mexico, however, and have noted the gradual change in foliage, from the sparse, somewhat twisted, slender-leaved form, which is found in the northern part of its range, to the wider shaped straighter form and more generous growth common to the South. But throughout its range, the flower remains practically the same in size, shape, and pose. It is a little more deeply colored in the South, that is all.

Of the many pictures of this charming desert aster that are enshrined in my memory, there are two which grow brighter and brighter with the passing years. One is where the flower grew in profusion on the face of a rocky cliff bordering that acme of drabness, Death Valley. And the other had its original in Painted Canyon, in the heart of the Colorado desert, where leafy clumps of the aster ringed the base of the high and almost perpendicular sandstone walls.

Many other floral dwellers of the desert are worthy of the highest praise. Among them are several shrubs and trees, which in their seasons, are bewitching bowers of bloom,—the palo verde, with its cloud of yellow, the smoke tree, a solid mass of dark-blue, the mesquite, hazy with fringy catkins of yellow-green, the desert willow, charming and attractive in a dress of pink-and-lavender, the scarlet chuparosa, and the white-leaved, yellow-flowered brittle-bush, or golden hills. There are others a-plenty,—the ocotillo, "candle-bush" of the natives, most striking and unique of the Colorado desert flora, and the yuccas, with the Spanish bayonet, glorious of bloom, and the Joshua tree, that grotesque plant creation which the Mojave Desert claims as its most distinctive feature, acting as the leading representative.

Thus does desolation bring forth beauty, and endless sand dunes lose their drabness, when the desert blooms.

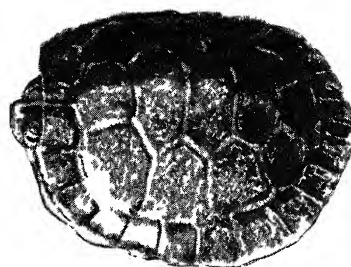


JUST SIX MONTHS OLD
*This inhabitant of ponds
and brackish waters has con-
siderable growing yet to do*

YELLOW BELLIED DELIAS

A Tale of
Florida Terrapins

by Lucy C. R. Ferguson



A MODEST FELLOW
*It's most difficult to catch
one of the Florida terrapins.
They avoid all publicity*

SINCE the days of Aesop there has been more than a passing interest in the strange creature that carries its house on its back and lives only in the sea—the turtle. And with the meeting of the first epicure and the first terrapin, an inhabitant of fresh-water ponds, the turtle's cousin has come in for a great deal of not entirely disinterested attention, considerably more, in fact, than that bestowed upon the land-lubber relation—the tortoise.

Down in Florida and southern Georgia lives a member of the family, the yellow-bellied Delia, as the natives call him, or the Florida terrapin, as correct nomenclature demands. Not as delectable as the diamond back, he is palatable, but really the most fun is to watch him rather than to eat him.

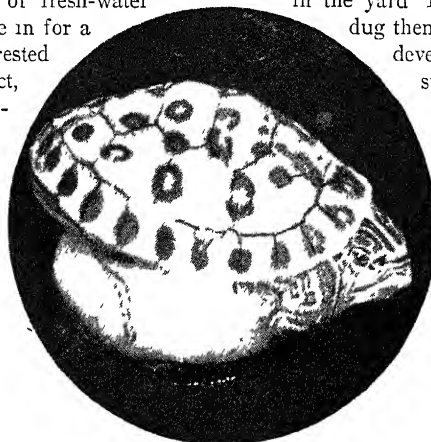
The lakes and ponds are full of his brothers and sisters, and they can be seen on bright sunny days, drowsing and sunning on old logs, or on the banks. They are difficult to approach, even the sleepy alligator, wary as he is, permits closer scrutiny than the "pond sliders".

In May, the laying season commences. The terrapins dig their nests close to the ponds in the hammock lands, or else climb the flanking dunes to lay in the dry white sands. A great number of the nests are discovered and destroyed every spring by raccoons, bears, wild hogs, and crows. I have seen even a king snake coiled around a

violated nest, and watched him eat the eggs left or overlooked by the first marauder, swallowing pleasurably.

Last spring I dug up a nest and carefully carried home the fifteen oblong leathery-shelled eggs, planting them in the yard. During the period of incubation I

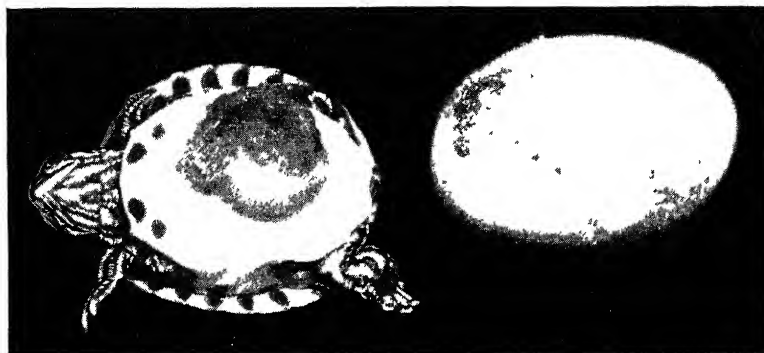
dug them up every few weeks to watch their development. Holding them before a strong light, just as one tests chicken eggs, I could see the embryo growing. For six weeks the development was slow, but by the end of the eighth week the entire terrapin could be clearly discerned. At the last testing on the seventy-second day, an active and lively infant filled the shell. As an experiment an egg was carefully opened; the yolk which feeds the growing embryo had not been entirely absorbed. The little terrapin was then wrapped in damp gauze and put near the kitchen stove. Twenty-four hours later the yolk was half the size of the previous



WHEN THE SHELL WAS OPENED
*The embryo, completely formed, still pos-
sessed part of the yolk, on which it fed*

day, and the shell had straightened and hardened somewhat. The little fellow was photographed again to show the yolk absorption, this time next to an unhatched egg. At the end of forty-eight hours only a small piece of the yolk remained, and this gradually dried up and disappeared.

It was not until the seventy-sixth day that the first egg hatched of its own accord. A few hours later a second terrapin appeared, but four more days passed before



THE YOLK
GROWS
SMALLER
*Compare with the
unhatched egg at
the right*

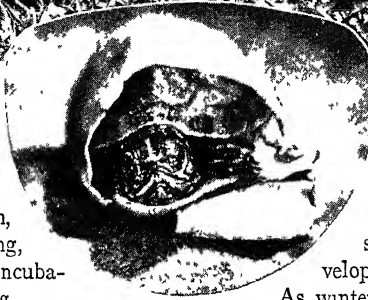
THE EGG
WAS SLOW
TO HATCH
*The embryo took
seventy-six days
to develop*



THE GOAL OF THE YOUNGSTERS
Note the babies on the plastron of the adult They have a long way to go

the remaining eggs hatched. Transporting the eggs from their original nest, and digging them up to test them, combined with a rather sunless spring, may have lengthened the period of incubation and caused the irregular hatching.

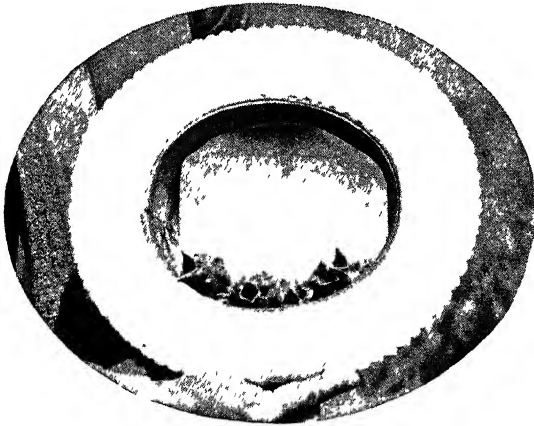
After a week's time all but four of the healthy and lively lot were liberated. These four were kept in a shallow pan of water and provided with a miniature ladder so that they could climb onto dry land. For nearly a month they were plied with food, all manner of insects,



JUST OUT OF THE SHELL
This terrapin hatched in the usual method He would not eat for days

earthworms, and small pieces of raw meat, to no avail. It was not until the middle of August that they suddenly accepted meal worms, and developed large appetites. They grew visibly.

As winter approached and the weather became colder, they took less and less interest in their food, lost their liveliness, and only occasionally indulged in gentle exercise around their box, frequently falling sound asleep, their heads stretched to high heaven. And from then until early spring their interest in life was small.



MEADOW LARKS

They Set Up Housekeeping In The Big City

by Sterling G. Harris

turned from work that night, the sward was short-clipped, and we rushed horror-stricken to the spot where the nest had been. But the birds had escaped the clattering blades. The mother hovered calmly over her nest. The young

It was April in New York, and above the city smells rose the odor of fresh, damp earth, of early flowers. The grass was turning green, the trees were beginning to rival it, and somehow the pull of the city as it murmured busily was less than during winter storms. And two meadow-larks, imbued with the season and the sun, looked over a back-yard grassy plot in Jackson Heights for another home. They set up housekeeping under a tuft of tall orchard grass.

We were worried. There were cats infesting the neighborhood who didn't like birds, externally. We considered a wire fence, and camouflages, and eternal vigilance. In the meanwhile, the family arrived, and five little wriggling puff balls with gaping mouths decorated the back lot. But the danger was only doubled now. One day the owners looked at the plot, ordered horses and a mower, and were blind to the splashes of yellow of the frantically moving birds. When we re-



still clamored for food. And the father busily walked about looking for worms, quite unconcerned about the near-tragedy which the day had brought.

JIMMY and JERRY



They Demanded
The Very Best

by Helen Dolman

PRESENTING JIMMY AND
FEMININE JERRY

*Not so handsome as some, perhaps,
but with better dispositions*



THERE they lay in the bottom of the box, two helpless bits of baby bird-dom, the queerest looking youngsters I had ever been asked to help rear. Their long, pale green legs and big fish-eating beaks told me that they were waders, but to one not thoroughly familiar with water birds, the buff down on the homely bodies would give no color-clue as to the species. I lifted them out of the box and put them on the floor. The slender toes, accustomed to grasping the rough marsh grasses, sprawled awkwardly and the large bills seemed to overbalance the slender necks. Though they would never have won a beauty prize, their very dependence

resisting throats. But this morning they would have none of it and she brought them to me for advice.

Now I knew quite well what papa and mama bittern would have fed these infants, but not being a good fisherman myself, and lacking fisherman friends, that diet seemed out of the question. Thinking that we might fool Jimmy and Jerry, however, we opened a thirteen cent can of salmon and offered them some of it. They looked interested but stubbornly closed their beaks after the first bite. Insulted! When we obtained a brand which sold for thirty-eight cents a can, they condescended to eat it and for several days opened



A CHARACTERISTIC POSE

Jerry froze like this when danger was near. Below, the author tries thirty-eight cent salmon, with success.

won my heart, I adopted them at once and dubbed them Jimmy and Jerry.

"Where did you find them?" I inquired of my student friend who had just placed the box on my desk. Such a gift on a July morning needed an explanation. She told me that these two American bitterns were discovered in the swampy edge of a lake, almost starved and too weak to stand. In a nest of reeds and rushes not far away, three dead bodies bore mute evidence of another tragedy among the wild things. She had brought the little creatures home, thinking perhaps to save their lives, and had fed them upon bread and milk, poked down their un-



IN NEED OF MOTHERING

Jimmy alas, had a low I Q, which perhaps led to his untimely death. Jerry mourned his passing.

wide mouths when they saw a salmon can—of the right price—coming.

By the end of the week they were able to stand alone and to walk awkwardly across the room. The floor with its hard surface resisted the efforts of their claws to gain a foothold, and they often slipped and went skating as if on skis. When the class laughed at their gymnastics they looked startled at the peculiar noise.

As they grew stronger they also grew more independent and began to leave their salmon meals, so we tried fresh fish from the market. They ate it grudgingly, then not at all. Thinking they were being spoiled

by too much pampering, we opened their mouths and forced it down, only to have them scornfully spit it out. At last they went on a hunger strike,—and we went fishing. All afternoon in the hot sun of an August day, we dipped and seined in the campus pond until we wearily brought our offering of tadpoles to the hungry youngsters. The problem was solved. Tadpole after tadpole disappeared down the ravenous throats until, no longer able to swallow they settled themselves and slept. Thereafter the small boys of the neighborhood were kept busy supplying food for the bitterns.

After a few more feedings by hand, I set the dish of water containing the live tadpoles on the floor and let the birds do their own fishing. Though Jimmy was the larger of the two birds, Jerry was the more intelligent. The dish in which we fed them was glass and Jimmy, seeing the tadpoles through the side of the dish, invariably tried to get them that way. He never seemed to learn by experience, but would peck away at the side of the dish until he saw Jerry successfully capturing them over the side. He would watch her a moment, his head on one side as if wondering why her plan worked better than his, and then follow her example.

Jerry also seemed to accept her cage more philosophically than did Jimmy. We allowed them to run around the room or in the garden for awhile each day. When they were returned to their cage Jerry would begin to preen her feathers and to make herself at home. Not so with Jimmy. He would pace up and down, striking the wire with his beak until the end of it actually grew crooked as it hardened.

If a cat or dog came near the cage, Jimmy would take a defensive attitude in front of the cowering Jerry, spreading his wings, drawing back his head and making a peculiar hissing noise. Both of them acted the same

way if a stranger came near but they followed us around the building.

Their pin feathers looked like bundles of tiny cigars which unrolled as they pushed out and at the end of five weeks their bodies were covered with the typical brown and white adult plumage. They began to take on grown-up ways. When we released them in the garden for their daily walk they used to stalk over to the bushes with the characteristic undulating gait of the bittern, and if we followed they struck a pose, beaks pointing toward the sky. Instinctively they depended upon their resemblance to a tree branch for protection.

By the time they were six weeks old we decided that they were large enough to care for themselves and planned to take them out to a marsh to release them. Since they had learned to trust human beings we were afraid to risk setting them free near town. The day before the one set for the trip the birds were left out for a few moments in the garden. Hear-

ing a great commotion, I rushed out to find Jimmy lying in a heap on the ground with Jerry standing over him. As I came near, she crouched in front of him, wings spread and hissing. Jimmy's leg had been broken, how, we never knew, and though we set it as best we could and cared for him tenderly, he grew weaker and would not eat. We finally chloroformed him.

While Jimmy lay on the floor of the cage or tried pitifully to move about, Jerry stood nearby and protected him when anyone came to molest. After his death she withdrew to one corner of the cage and stood, shoulders hunched, wings drooping, head upon her breast, a pathetic silent figure, refusing food, rejecting the human aid she had once welcomed. When she, too, died there were those who said that a dog must have hurt her, but I shall always believe that she found life too lonely without her Jimmy. And it might be that I am right



ON A FIELD TRIP

While unable to fly each bittern was quite curious about what went on in the big, big world

A QUEER ELM

THE great West has its sequoias through which auto trails are carved, but it cannot boast of anything more freakish than this elm, which forms an archway over the highway. The elm, when a sapling, was bent over by a falling tree, and the forked top became embedded in the ground. It took root, and grew up at the right. Not content with this, it sent up



by A. G. Buerge

three trunks from the arch. Thus it has become a four-in-one tree, and one of the strangest sights in the vicinity. Nevertheless, since it is not on a travelled road, not more than ten per cent of the inhabitants of Reed City have seen it, and it grows quite unattended and unadmired. Yet all Michigan has no more unique Nature product than exists in this little town in the Wolverine State.



AT TIMBERLINE IN THE HIGH SIERRA

Barren? Not at all, to those who love the wilderness in its primitive state

Remnants of Wilderness

Shall "Open Spaces" Pass Forever?

by Ward Shepard

Photographs by Courtesy U S Forest Service

WE had dropped at nightfall over a daring and dizzy trail to a lonely mountain meadow high in the Sierra Nevada. In the dusk we unsaddled our horses, unpacked our supplies and blankets from the mules, and turned the animals out, hobbled and belled, to graze in knee-deep grass. Then we gathered firewood, brought water from the stream, and cooked and ate the simple fare of the mountains. Afterward we reclined in the fragrant grass and talked quietly as our fire wove patterns of light on the trunks of firs and pines that were immemorially old.

Night and solitude walled us round. The waters of the mountain stream played only a vague accompaniment to the universal silence, the bells of our horses gave out a muffled tinkling, our voices were subdued in the all-engulfing stillness. Above the black outlines of the canyon walls the stars shone brilliantly, for by some trick of the rarefied atmosphere at that high altitude, they seemed to hang beneath the dark purple vault of the sky, and glow warmly just above the tree tops like swarms of fireflies.

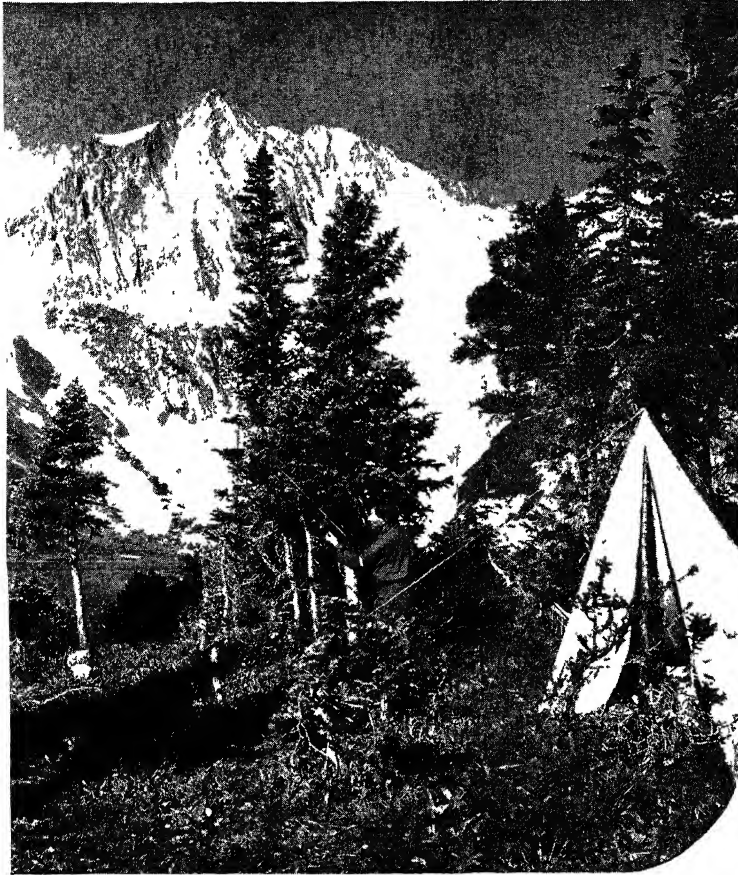
We had come to the wilderness for rest—and we had found it. For months we had been hemmed in by the clamor and hurry of the city, by its prodigal waste of energy and brutal indifference to spiritual repose. In this peaceful spot, as we sat beside our waning fire, the strident metropolis seemed remote and unreal and its restless activity feverish and abnormal compared with the powerful peace of Nature.

In the two weeks ahead of us we should be able to travel the length of several such canyons and camp each night in a fresh unspoiled spot as lovely as this. We thanked the god of good vacations that these wild fast-

nesses ahead of us had thus far escaped the fate of "development," and that we could disappear so easily from the grinding pressure of man-made events.

"But you can't depend on luck," said my companion, "to keep this kind of country off the road maps. I've been up and down this state for eighteen years and I know considerable country once as wild as this that is now full of motor horns and filling stations. If anyone wants to

As Mr. Shepard points out in this article, wildernesses are passing. Just as the glaciers of Glacier Park are melting, so that future generations will not see them, so the great, wild tracts where one could completely shake off civilization are disappearing. The people cannot save the glaciers, but they can save the "open spaces." The deserving minority, which is not as small as may on first glance appear, should be the leaders in the movement. The American Nature Association heartily endorses Mr. Shepard's viewpoint, and will be glad to cooperate with all active agencies striving to bring about the desired result. As Mr. Shepard says, "The answer depends on the force and articulateness of the demand for wilderness areas."



THE GLORIES OF THE CAMP
Near some crystal lake embraced by
peaks, where sounds of "civilization"
are drowned out

keep any samples of American wilderness for his descendants, it's my opinion that he had better make his wants known as quickly and loudly as he can."

I had to admit, from what I had seen in my travels as a forest inspector, that he was right. For everywhere the road builders, armed with unlimited money and machinery, are pushing their winding ribbons of stone into the forests and mountains. "Loop roads," "scenic drives," "skyline routes" are invading places that a generation ago were regarded as permanently given over to wildness and solitude. And with the roads come hordes of motors, armies of tourists, and all too often, myriads of "hot-dog" shacks and filling stations and billboards,—and loudspeakers, and telephones, and all the other mechanical effluvia of what is generally called civilization.

Not of course that one can really stop this onrush of the modern spirit. The earth is being subdued to man's will and to the gorgeous toys of the mechanical age. Soon it will have all "modern improvements" from pole to pole, from the upper Orinoco to the basin of the Congo. But there are some remnants of the wilderness still saved from invasion and destruction by modern civilization. In our eastern country, except for a very few spots like the summit of the Adirondacks and the Great Smokies, and the country north of Lake Superior, the wilderness is indeed already gone. But in the West, especially in the National Parks and the National Forests, a surprisingly large amount of coun-

try uninhabited and unpenetrated by highways still exists.

Fortunately much of the remaining wilderness of the West is in public ownership, either as National Forests or National Parks. Being curious to determine just how much real wilderness was left in our vast system of National Forests, the Forest Service has made a careful study of its road system and of the extensive National Forest areas that are still roadless. First it made an arbitrary definition of a wilderness. A real wilderness, it decided, must have spaciousness—enough to permit one to travel on foot or horseback for a week or two without crossing and recrossing one's tracks. It would be difficult to do this in a territory of much less than 360 square miles, and this was chosen as the smallest acceptable wilderness. An area of that size contains nearly a quarter of a million acres and is equivalent to a square about nineteen miles on each side.

With this sizable morsel of "God's country" as a guide, the Forest Service set out on its thrilling pursuit of the wilderness. It wasn't a matter, though, of sending out expeditions to explore the National Forest hinterland. On the contrary, all that was needed for the moment was a painstaking study of road maps, but this seemingly dull job yielded some surprising results.

The study showed that there are still left within the National Forests seventy-four roadless areas ranging from the minimum size of three hundred and sixty square miles up to nearly eleven thousand square miles. Imagine a square more than a hundred miles on a side without a road and almost without a habitation and you will have some conception of the largest of these tracts.

Here, then, are wilderness areas worth reckoning with. The situation is not as bad as had been feared. And cautiously the Forest Service is working out a plan to preserve some of the most suitable of them in their primitive state. Fortunately, many of them lend themselves to this purpose without serious conflict with other possible uses. For by a process of natural selection, the road builders proceed from the easy to the difficult and usually leave the wildest and most inaccessible and economically least valuable regions without roads until the last. That at least was true in general until the immense program of federal and state road-building demanded by the automobile brought the purely recreational road to the fore.

So, of the seventy-four wilderness areas left within

OVER THE TRACKLESS TRAIL

"Where shall we go?" Where spirit guides, where Nature is untrammelled, where one can breathe

the National Forests, it is probable that the majority are of rather low economic value. Most of them are high mountain country, with scattered forests that may in large part always remain commercially inaccessible—a land of challenging peaks, of precipitous escarpments, of granite walls and domes intermingled with rough canyons, wild forested glades, alpine lakes, and flowered mountain meadows.

In most of these National Forest wildernesses, the pressure for economic development is not yet intense and is not likely to become so for a good many years. Summer grazing, to be sure, has long been established in much of the high mountain country, but, properly managed, grazing is perhaps not generally incompatible with the wilderness plan. Much of this wilderness country is not well adapted to lumbering because the forests are difficult of access, often sparse, and needed for watershed protection. In any event, the Forest Service believes that future economic demands must be faced as they arise and dealt with in the light of the Forest Service principle of the greatest good to the greatest number.

If there is a public demand and a social need for wilderness recreation, then many of these wildernesses can doubtless be preserved against more utilitarian demands. Apparently there is no insurmountable legal reason why they can not be. If the changing social



needs of the twentieth century demand that at least some remnants of wilderness be kept intact, the organic law which provides that national forests be established apparently gives authority for safeguarding them against other conflicting uses. There is, to be sure, an extremist utilitarian school of thought that believes that every tree must be cut when it matures, that every flower and blade of grass must be turned into mutton, that every ounce of mineral must be extracted from the earth, and that every waterfall and dam site must be equipped with

electric turbines. Like all other extremists, however, they over-simplify a complex situation and sometimes forget that "man can not live by bread alone". Varying human needs, including the spiritual, must be provided for.

The immediate threat to the remaining National Forest wildernesses, then, is not lack of legal authority to preserve them, nor the pressure of more utilitarian demands, but the rapid invasion of roads. It is on this danger that the Forest Service is concentrating its present effort. It is working out a policy of withholding roads from areas primarily of wilderness value, unless roads are needed for fire protection or for other urgent reasons, and of withholding permits for recreation structures of any kind within such areas.

But regardless of the official policy of the Forest Service, can such wilderness areas be permanently preserved against other competing demands? The answer depends on the force and articulateness of the demand for wilderness areas. In the present stage of American civilization, the demand for 'preserving wilderness remnants comes from a minority, but a minority with a well-defined point of view and philosophy of life. According to this view the wilderness is a priceless heritage that has had much to do with molding the character of America and that even as a place of recreation will help to instill qualities of independence and self-reliance. But above all these things, the wilderness yields a special quality of pleasure and satisfaction that can be found in only one other part of the globe—the sea. This minority of outspoken wilderness enthusiasts believes there will be a steadily growing demand for natural recreation as the American people continue to cultivate their fondness for outdoor life and become bolder and more independent in their ways of seeking it.



OR LET US HIT THE WATER ROAD

To pioneer in our own wilderness, free from auto horns and billboards, as did the voyageurs of old

The preservation of wilderness areas is not a mere theory. In the East, a large section has been successfully preserved under state ownership in the higher and more rugged portion of the Adirondacks.

That numerous majority, "the average man," is perhaps a little skeptical. "Does America need wildernesses?" he asks. "What have modern men to do with these primitive and uncomfortable places? Why turn the clock backward and perpetuate the rude *milieu* of the pioneer and the explorer?"

A surprisingly large number of people, however, like to take their vacation in real wilderness country and with more than a touch of wilderness hardships. After all, it is in the blood. It's the way our ancestors lived, a touch of it now and then is good for the soul and the body. A little toughening up, a little strain on the moral fibre, a little demand on physical hardihood—these are good antidotes for the softening influence of the city. A balanced life demands contrast—and between

special privilege for the favored few. No doubt those demanding this type of recreation are likely to remain a minority, but they point out, in reply, that many other types of recreation are provided at public expense for other minorities. Thus, they argue, only a minor fraction of the population make use of public golf links, or of public tennis courts, or of public swimming pools, or of any other one type of recreational facility. So it might be inferred that the test of democracy in such matters is not the number of people who use a given facility but the equality of opportunity to use it.

Compared with other types of travel, wilderness recreation is relatively inexpensive. How can one travel more cheaply than on foot or horseback or by canoe? How can one subsist more inexpensively than on simple camp fare cooked by oneself? How can one lodge at less expense than in a blanket under the stars? Wilderness travel requires things other than money,—a certain measure of hardihood, a love of adventure



the real wilderness and the side-walks of New York the contrast is absolute! I know a physician who, after a strenuous winter of mending broken people, mends himself by a month or two in the wilderness of northern Maine. In Oregon, a girl reporter traversed the wildest length of the summit of the Cascades with only a pack-burro for company. In the lake country of northern Minnesota and southern Canada an increasing number of people seek adventure by the canoe trails and portage. In the Sierras of California, in the Rockies, in the Adirondacks and the Appalachians, in the lake country, in National Forests and National Parks, one meets wilderness travelers by foot, by horseback, and by canoe. To many, Glacier National Park is the favorite park for the very reason that it is the least developed for the handling of the motor tourists and those visitors who are not inclined to take to the back of a horse or hike the mountain trails to discover the unspoiled glories of this playground, which is theirs to enjoy.

Some critics of the wilderness plan have feared that wilderness recreation might be undemocratic and a

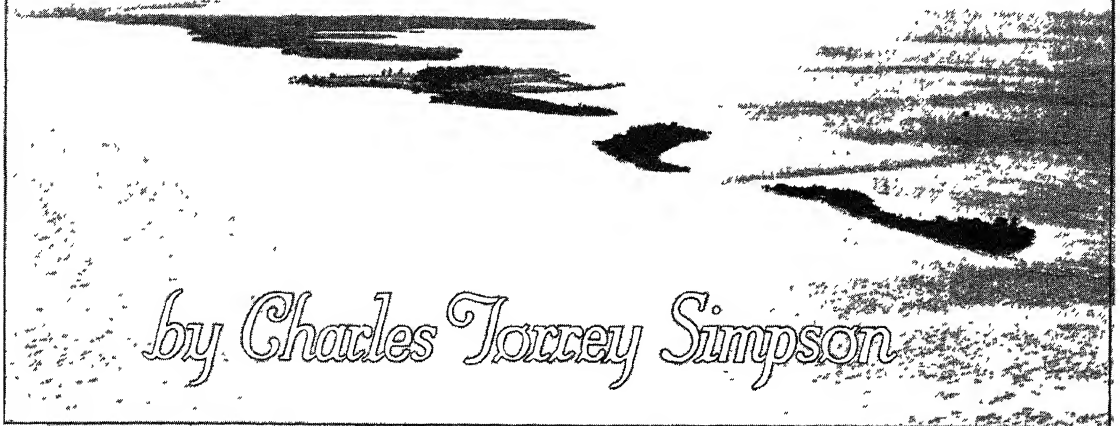
THE THRILL OF THE OPEN SPACES
They are a minority, the wilderness lovers, but large enough to deserve their heart's desire

and a fair degree of skill in living and traveling under primitive conditions.

America has taken to outdoor living and outdoor recreation because it is an antidote to the over-sophistication and over-mechanization of modern life. The modern city man is slightly tired of his squirrel-cage existence. He demands a place in the sun, a chance to live at least a fraction of his days, as God intended, outdoors.

Of these things we talked that night in our lonely bivouac in the high Sierra. By and by our fire died down and we wrapped ourselves in our blankets. Round about us everything suggested peace, simplicity, and power. Here Nature was working out her endless cycle of change without haste and without clamor. For aeons the stream had been quietly carving its granite canyon; for endless ages the giant trees, generation after generation, had pushed their spires skyward. Here was the peace of God in its full beauty. Surely a few such remnants of an antique world deserved to be saved forever from the strident clamor, the grind and hustle of the machine age.

KEYS OF A WONDERLAND



by Charles Torrey Simpson

WHERE FLORIDA ENDS NATURE BUILT THE REEFS OF CORAL

Extending far into the rainbow sea of many colors, rich in fascinating life—the Florida Keys from the air

R. B. HOIT

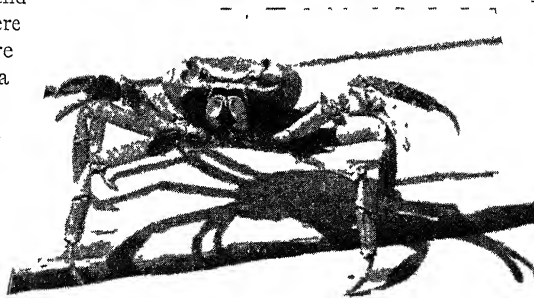
LONG ages ago a reef began to develop near Cape Florida, following the curve of the Gulf Stream down to the south side of Big Pine Key. When it had reached the surface the sea attacked it, tearing up masses of living coral and hurling them back, these were dragged back and forth by storm action until they were broken down and often ground into sand and the whole was cemented into solid reef. This now forms what is called the Florida Keys, and outside of it at a distance of a few miles another reef has formed, now in the very prime of life and beginning to reach the surface in many places. Here, on this outer barrier, one can have an unlimited opportunity to observe, to collect and be amazed at the wonderful development of tropical marine life.

Many years ago I was at the Tortugas, which lie at the extreme western end of the reefs, during a time of exceptionally low tides. In the morning and evening hundreds of acres of staghorn corals were laid bare and stood from a foot to eighteen inches above the water. They were of a rich, reddish brown color, and while some of the arms were nearly horizontal others were erect. Nearby there was a great area of the worked-over reef thickly strewn with broken fragments from the size of a pebble to a half

ton's weight and while most of it was covered with water at high tide, it was bare at low tide, save for pools here and there. Whenever I turned over one of these coral blocks a host of minute crabs of a great variety of species scuttled away, red, brown, blue, green, orange or yellow. Many hermit crabs lived in small shells of mollusks, some of which were rare, but it required quick work to catch them for they were away and hid almost the moment they were uncovered.

There were specimens of the "corn pone" a great heart urchin, whose name is especially fit and which becomes eight inches or more long, often living in company with a giant, dirty yellow starfish. This fellow is covered with warts and is a foot across, the granddaddy of all stars. In every depression were sea urchins, living in holes which, it has been supposed, they dissolved out of the rock by an acid secretion, but which Alexander Agassiz says they chisel out with their teeth. It doesn't seem possible! One of these, a *Diadema*, is an incarnate fiend for about as sure as I ever reached into a crevice or hole for a shell I got stung by its terrible spines which broke off in my flesh and made a bad sore.

If one would clear away the rubbish that accumulates in the hollows of the reef

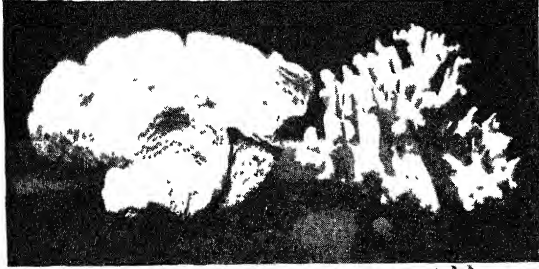


(Above) THE HELMET SHELL

One of the beauties of the reef

(Left) THE EAST COAST LAND CRAB

On the reef there are many tiny crabs



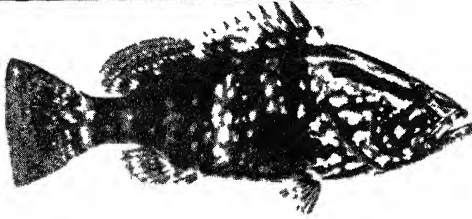
FROM BENEATH THE WATERS
OF FLORIDA'S REEFS

At the left two types of corals and at the right the thorny oyster which should offer quite a problem to the oyster opener



PHOTOS BY M. A. ROPLER

NASSAU
GROUPE
AT RIGHT
And below a star-
fish snapped in
the act of swim-
ming



one would be apt to find a sort of nest lined with spun threads and within it a lima. It has a pure white bivalve shell and brilliant scarlet animal, while from the mantle hang scores of snake-like tentacles. The Noah's arks, too, will be found hidden away in rock crevices, tied to some solid object by a spun byssus and so covered with trash and sea growth that the most expert fish would never find them. Great tritons, eighteen inches long, with handsomely variegated brown shells and bodies of a strawberry red, lumber along over the irregular floor of the reef and one may find an enormous *Fasuiolaria* with a knobbed brown shell and an animal colored much like that of the triton. It is one of the very largest gastropod mollusks in the world, its shell occasionally reaching a length of two feet.

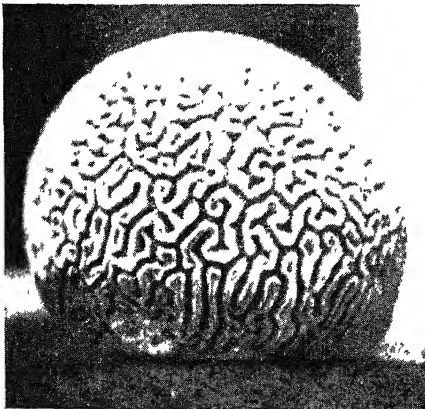
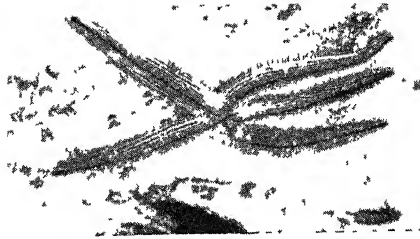
The whole reef, dull and forbidding as it is, swarms with life. Break open any old piece of coral and it is full of a variety of forms, date shells, botulas, choristodons and a half dozen others. Every crevice is filled with the flat-shelled perna until one wonders how they ever open. If a bit of wood happens to float on to the reef it is riddled with shipworm and other

borers. Various sea worms look out from their narrow prisons and open into lovely flower-like forms when undisturbed.

Formerly the best way of going down into the sea was in a suit, but now we have the diving hood or helmet, a large brass cap which covers the head and rests on the shoulders, having a great glass eye in front, and air is pumped down into the top of it

from above. With this it is easily possible to work with comfort in water of moderate depth provided one keeps the affair in a reasonably upright position. Years ago I made my first dive with one of these at a little key south of the lower chain in probably fifteen feet of

water and in a somewhat open place. When I reached the bottom I saw that everything about me was covered with the most exquisitely delicate vegetation, some of the seaweeds I supposed. Many were elegantly branched with finely cut fronds and all were pale colored. I even thought that some of them were in bloom but I knew that seaweeds do not blossom. Where was I? Could I



(Left) BRAIN
CORAL

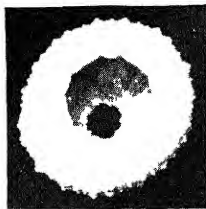
Abundant on the
Florida reefs and
often several feet
in diameter

(Right) A SEA
FAN

Pterogorgia, one
of the most beau-
tiful and abun-
dant

PHOTOS BY
M. A. ROPLER



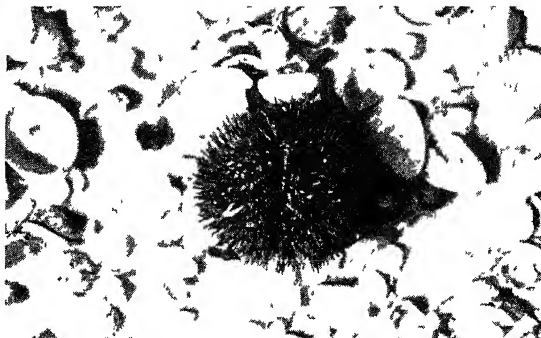


MANY ARE FLORIDA'S FASCINATING SEA ANIMALS

At the left the test of a sea urchin and at the right is the spiny little live animal

W A MURRILL

H H SCHRODER



be on Mars or Venus or some other planet where there was a totally different order of vegetation from that of our earth? Then I noticed that along the stems of these plants were little buds or cups and it dawned on my stupid brain that these were not seaweeds at all or any kind of vegetation but hydroids, something closely related to the true corals but having soft bodies.

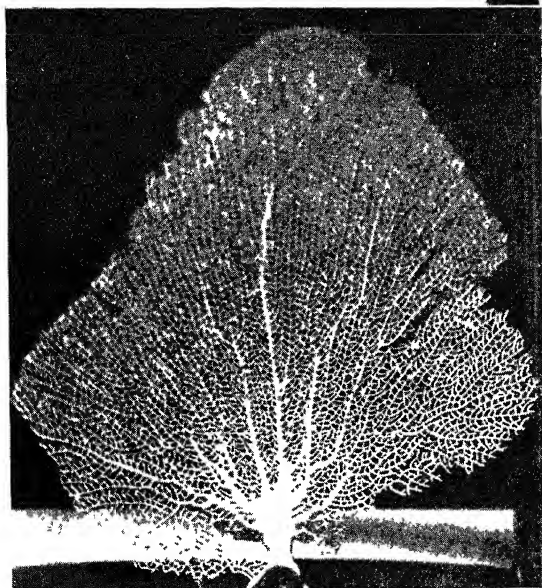
I moved the anchor of the row boat which floated above me so that I could go to where there was a heavy growth of coral which in places rose considerably higher than my head. No language of mine can tell anything about it, the sight was overwhelming. At the bottom resting on white sand were masses of brain corals and a variety of other forms, and among them grew fantastic sponges. With an open space between them two great masses of staghorns stretched up ten feet and, after sending off numerous branches, actually came together forming an incomparable arch. The bottom was gleaming white sand, the water, which seemed so clear from above, was filled with a



soft, dreamy haze which did not seem in the least to obstruct the vision. Floating under and beyond the arch were hundreds of dazzlingly brilliant little fishes that seemed to be poised in the water. They slowly drifted along past me and as they went by I made an almost imperceptible move and in the thousandth part of a second every one of them had flashed out of sight. They had, apparently, gone nowhere.

The landscape of the reef is marvellous. It is imposing. Corals are piled up in the wildest confusion, they cut the water-sky line with wonderful and startling effect. Ragged cliffs jut out and appear to be magnified, so that they sometimes seem mountain-like. Great chasms open out below that are apparently bottomless and which fill the soul with fear. Everywhere there are springing up the wonderful sea fans, often higher than one's head, either yellow or purple, always light and unbelievably graceful, usually waving as if gently moved by the wind. While the whole effect is almost

A SPONGE FORM
These take on a variety of fantastic and beautiful shapes



stunning yet there is something about it so unreal that one can scarcely believe that it exists.

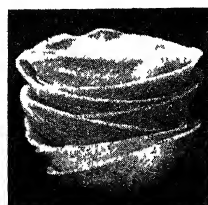
But the glory, the masterpiece, the great source of thrills is the fish. There is astonishing color in the reef and its attached animals, the sea fans, the worms which shine out like stars, the wonderful anemones, blossoms of the sea, a great variety of curious sponges, and other

SEA FAN AND THE SHELL KNOWN AS BUTTERCUP

The fan, the gorgonia, is one of the loveliest and is found everywhere on the reefs of Florida

M A ROPER

W A MURRILL



forms of life. But all are pale and of little merit compared with the glorious fishes. There are more than six hundred species of them in Florida and nearly half belong on the Keys and reefs. Of these it is safe to say that more than one hundred are splendidly painted. There are Nassau groupers dressed in white, gray and various shades of brown; rock hinds, mutton fish; schoolmasters, decked out in a half dozen wonderful colors, the blue parrot and the toro, the former a solid blue, the latter entirely a lovely red. There is a group of chaetodons, the butterfly or angel fishes, whose coloring is so simply impossible that one cannot believe it after seeing it. The species have compressed bodies which are short and high, something after the manner of the well-known "pumpkin seeds" of our fresh waters and one of these, the blue angel-fish, which reaches a length of two feet, has the body variegated blue, shading off to red on the hinder fins and the tail, the forward fins and cheeks yellow. But the queen of all, probably one of the most splendid forms of life on this planet is the rock beauty. The body is soft, satiny black, its front part, tail and the hinder edges of the anal and dorsal fins a brilliant gold, the mouth blue and there are touches of red at the gills and on some of the fins. According to the books this fish has not been found in Florida, but after a storm which stirred up the sand of the sea bottom until it filled the gills of millions of fishes I saw hundreds of this rock beauty with countless other kinds thrown up on the beaches above Miami.

One is inclined to ask, "Why this gorgeous color?" I

confess I cannot tell why in many cases. Perhaps largely because of the strong, brilliant light and the heat of tropical regions. The shells of certain mollusks along our coast are dull colored at their northern range but brilliant and highly colored where they approach the tropics. Certainly it does seem that such glowing color would reveal their owner's presence to their enemies. Yet much of the reef life is dull and much is concealed. It is a constant fight for life for everything captures and eats something else. Yet every form has some means of defense, of escape or concealment.

Probably some of these highly-colored fishes are not edible and therefore are not molested. Most of them are amazingly swift and are, doubtless, endowed with excellent sight: they generally have some place of refuge or concealment close at hand.

I cannot more appropriately close this article than by quoting from Beebe: "Until we have found our way to the surface of some other planet the bottom of the sea will remain the loveliest and strangest place we can imagine. . . . All I ask of each reader is this,—Don't die without having borrowed, stolen, purchased or made a helmet of sorts, to glimpse for yourself this new world. Books, aquaria and glass-bottomed boats are, to such an experience, only what a time-table is to an actual tour, or what a dried, dusty bit of coral in the what-not of the best parlor is to this unsuspected realm of gorgeous life and color existing with us today on the self-same planet Earth."

Truly a wonder-spot is the bottom of the tropical sea.

This excellent article by Dr. Simpson was originally scheduled for our December, Florida, issue but with space at a premium it was necessary to hold it over for publication this month.

THE WAY of a GROUND-HOG And Does He Care for Ice-Cream Cones!

by Marvin T. Gowen



BILLY is a pet ground-hog which lives in Davidson Park up in the business section of the town of Tullahoma, Tennessee. Some time ago he set up an establishment in the middle of a flower bed, where he still lives happily. The children feed him cabbage leaves, peanuts, popcorn, candy and ice-cream cones, and cry out his popularity.

Mayor W. J. Davidson, the builder of the park and the namesake of Billy, built a wire fence around the flower bed, and Billy steps inside when dogs appear. And from within this fence, Billy greets his friends by running to meet them, standing in proud position as if to say, "Welcome, friends," but it's popcorn and ice-cream which fills his mind.

A popular fellow, this. Everyone in Tullahoma gets down to Davidson Park to see him, and takes his friends "Billy, have an ice-cream cone?"



READY FOR MORE
One has difficulty in filling this fellow up, but he's worth it

"A FULL GROWN RAT WHICH SHE
DRAGGED WITH LABOR TO MY DOOR"



JUST a CAT

by Stephen Haweis

Illustrated by R. Bruce Horsfall

MY STUDIO in the Rue Delambre was on the first floor, or, if you prefer it, on the top floor, for there was nothing above it and very little in the shed beneath but old junk. Three sides were glass, painted in the hope of partial privacy, and it was reached by what I then called an outside staircase, today I should describe it as a near-relation to a ladder. Neither the shack nor the ladder were safe, no safer than the sanitation about which, even at this late date, I cannot bear to think. My wooden abode leaned wearily against an aged brick wall and at the top of the ladder a hole gave, to the over-inquisitive, access to the roofs of other studios in which several ill-nourished sons of Apelles with sorrows of their own, painted pictures and devised ingenious means of keeping alive.

The hole to the roof was used habitually by only one resident of our court, a cat which belonged to M le Marronnier, a sculptor of some distinction today who had then just missed the coveted Prix de Rome by no more than a single vote. He was a remarkable man, that sculptor, a gentle dreamer, an idealist, reserved and remote. He spoke sparingly and to very few for he objected to the Anglo-American invasion of the Latin Quarter and he had a dignity which made him difficult to approach, especially for young foreigners as the rest of us were. Seldom came visitors to his door and foreigners never—he was exceedingly French. If we heard his voice it was generally in converse with his cat to whom he spoke on equal, familiar terms. To me the cat was just a cat, whose familiar thump when it dropped on my doorstep from the roof I could recognize at any hour of the day or night. The cat was as remote and unsocial as its master, but it was not less remarkable.

One morning I heard it pass my door with a live, protesting sparrow in its mouth, and following it I thought to deprive the hunter of its prey. I could not do so, of course, but I watched it run across the court to its home and make muffled miaows while it scratched frantically at the door. It had still not killed

the sparrow which screamed and fluttered with hopeless, useless courage. But its doom was sealed, of course, I knew that.

M le Marronnier came to the door in his brown working blouse slightly spattered with clay, and the sun set a faint nimbus of gold on his fluffy brown hair. He threw himself into an exaggerated attitude registering astonishment and delight.

"What, my love, success has attended your hunting! What skill! What stealth of foot and speed of claws! Thou art certainly the greatest of all hunters since fleet-footed Diana, and the spoil of the chase is for me, thy friend? *Bon—I accept it!*"

He bent down quickly and took the bird tenderly in his hands and said while he gently arranged its ruffled feathers:

"And thou, little brother, be more careful in future, for all cats are not like Minette: there is not another like her in all the world, *n'est-ce pas*, Minette? So frightened . . . see, Minette, how lovely are its feathers . . . and now fly, you are free. But to remain so requires caution; be more watchful in future!" And the sparrow departed with all possible haste, quite uninjured. The sculptor went back into the studio but through the half-open door I heard him continue his conversation with the cat.

"And now the reward of kill and kindness. Milk it shall be in a lordly dish and sardines from Amient Frères—we shall open a new box for the most beautiful cat in Paris, *mon amour!*"

I could bear it no longer. Fighting the diffidence with which I suffered, I found myself opposite the sculptor's door. The cat was finishing the last of the dainties. I knocked on the door.

"Pardon, *Monsieur*, pardon my intrusion, but your cat," I blurted out, "it is the most marvellous thing I ever saw . . . do tell me."

"Minette is a person, yes, she is remarkable. She is not an ordinary cat, for she was born of wild parents. I took her from the nest in an oak tree far from human habitations in the forest of the Ardennes. It was in

a hole fifteen feet from the ground I watched for days for a chance when the old ones were both away, for they are dangerous, those *bêtes* I think the father was a real wildcat and the mother a domestic cat escaped from some village and become wild There are many there like that She fought me fiercely too, but became friendly after a while I worked to win her affection and one day when she was still not much larger than my hand she fought and killed a full grown rat which she dragged with labor to my door; she has courage, that little one. Thus she accepted me. Then she brought me a bird, but I did not wish her to kill the birds "

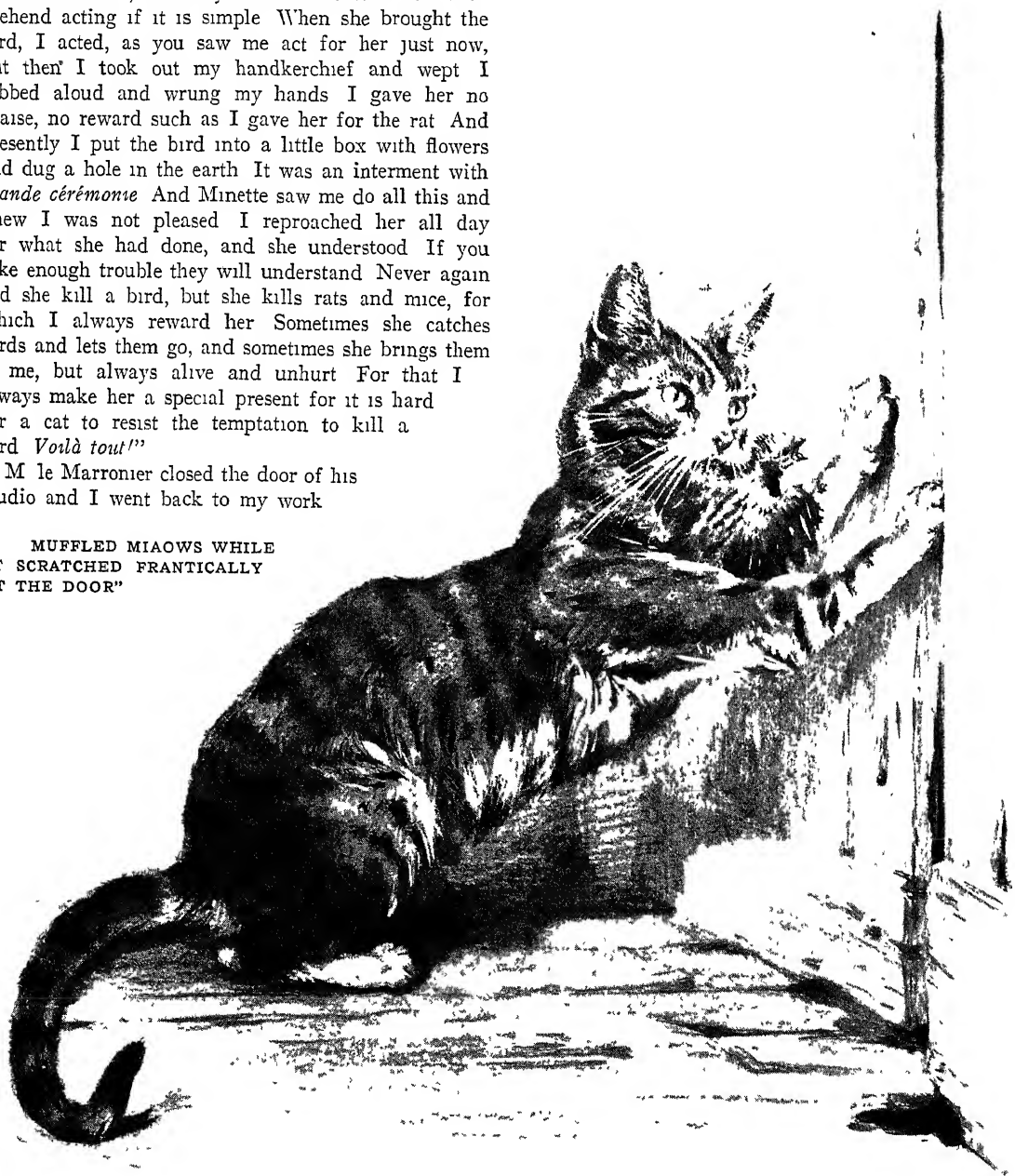
"But how did you teach her?"

"*Voyons*, the cat can understand a good deal of what I say to her—now, but at first she did not understand French, naturally. But all creatures can comprehend acting if it is simple When she brought the bird, I acted, as you saw me act for her just now, but then I took out my handkerchief and wept I sobbed aloud and wrung my hands I gave her no praise, no reward such as I gave her for the rat And presently I put the bird into a little box with flowers and dug a hole in the earth It was an interment with *grande cérémonie* And Minette saw me do all this and knew I was not pleased I reproached her all day for what she had done, and she understood If you take enough trouble they will understand Never again did she kill a bird, but she kills rats and mice, for which I always reward her Sometimes she catches birds and lets them go, and sometimes she brings them to me, but always alive and unhurt For that I always make her a special present for it is hard for a cat to resist the temptation to kill a bird *Voulà tout!*"

M le Marronier closed the door of his studio and I went back to my work

" MUFFLED MIAOWS WHILE
IT SCRATCHED FRANTICALLY
AT THE DOOR"

The incident did not lead to any greater intimacy with M le Marronier, but I am sure his cat treated me henceforward with less clearly defined disdain Presently I was removed to a hospital and during my absence the police condemned my studio as unfit for human habitation My effects were removed by friends and I was sent to convalesce among the apple-blossoms of a village near Rambouillet When I returned to Paris I revisited the cause of my afflictions and found that le Marronier had left his studio also and that the whole courtyard was being dug up to prepare for the building of an apartment house fit for human beings, the artists had all been obliged to move. I



did not hear of le Marronnier for nearly two years, but one day I saw him on the Boulevard Raspail looking very depressed. I did not know if he would remember me, or acknowledge the acquaintance if he did, but I stopped him to ask for news of his cat.

"Ah, I remember, yes, I remember, you knew Minette too, my poor friend. You see me in great sorrow. I have lost my companion of so many happy days, she is dead. They stole her from me."

"They stole your cat?"

"*Ah oui*, and I am heartbroken; it is nearly two months ago now. I live up beyond the Lion de Belfort, it is a very poor district. You know I wished to make pottery, simple, beautiful pottery for the poor people to use, for cooking, for the household many usages, so I went to live among them. We must make sacrifices to be of any use to our fellow-creatures. They are very poor and ignorant in that district and they did

not know. I sought for her everywhere, I offered rewards, a hundred francs, two hundred, more, but it was useless. For such a reward everybody in the neighborhood was seeking my Minette, but she was dead. I discovered. I know who it was, but I could not get her back. Of what use a *procès-verbal*? Minette, my beloved, was already dead."

"They killed your cat, for sport?"

There were tears in M. le Marronnier's eyes. He wiped them unashamed.

"*Voyons, mon ami*, a man came to me one day and said, 'I ask your pardon—it was I who killed your cat. I cannot bear to have you hope any longer. I ask your pardon.' The people are very poor in my neighborhood. I do what I can for them, but no, they did not kill her maliciously, or for sport. They are poor, they killed her to eat. That is what happened. One must make sacrifices!"

IMAGINE to yourself a creamy white frog, seated upon a lily pad—as beautiful and ornamental as the blossoms near by, or the gold fish flashing in the water beneath! And such a creature is not the product of an idle summer's dream, as the accompanying photograph proves beyond all doubt.

In April, 1927, an embryo biologist of High School age happened upon some albino tadpoles swimming about in a pond with their dark kindred. Realizing that this was something out of the ordinary, he brought home a number of specimens, and placed them in an artificial pool. Lily roots, reeds and the like were planted to provide natural food, and in about two months the metamorphosis took place under the eyes of eager observers.

One of the amusements of the summer was tossing angle worms to them as they sat in various poses of expectancy under the shade of the plants which grew about the pool, waiting for a meal to come. Eight or ten of them used to be in sight at one time.

An entertaining little scene was enacted one morning, after a large "oversize" worm had been dropped in front of one of them.

In just a few moments the frog made his catch, and began swallowing. When about three-fourths of the worm had disappeared, it became evident that the frog could hold no more,—and so, with a quarter of the worm still at liberty, he paused for rest—perhaps to ponder as well!

The White Frogs

Something Strange Under the Sun

by Mrs. Cecil Sarvis

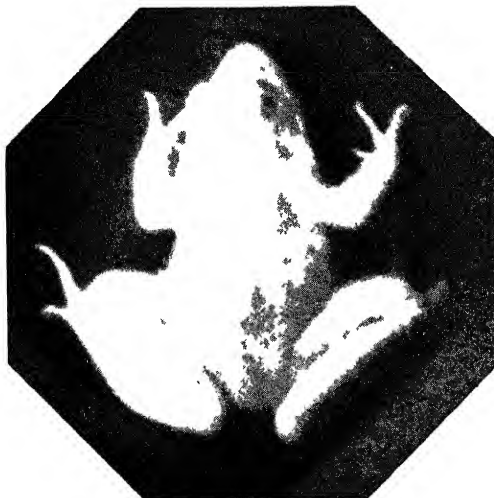
Taking immediate advantage of the interval, the worm started crawling out. He had almost gained his liberty, when the captor woke up to the situation and commenced, furiously, to "swallow" again—using his fore feet to shove the worm into his

mouth. But the result was the same as before.

About a foot away, under the shade of an alder shoot, sat Froggie No. 2, who now began to take an interest in the struggle of his neighbor. Hopping over and taking hold of the free end of the worm, which still dangled from No. 1's mouth, he pulled valiantly. The result of which assistance was that the worm was transferred "in toto" to the stomach of the earnest helper, who, being a little larger than the other, managed to hold it all. Gorged to the bursting point, this creature made a labored jump into the pool, and stretched himself prone to digest his banquet in utter relaxation, while the interested observer hastened away to procure a form-fitting worm for the victim.

When cold weather came, some of the then plump and well-developed frogs had apparently lost the hibernating instinct, and were caught in the ice and perished. Thus the approach of Spring was awaited with more than the usual impatience, and the pond was anxiously watched to discover if any of the white frogs would reappear.

One bright day in March, the fellow pictured here climbed out on a sunny bank—still quite sluggish, yet very much alive,—the sole survivor of the brood.



A Novel Hobby

by C. F. Greeves Carpenter

Photographs by Cornelia Clarke

HAVE you ever seen the miracle of a cabbage butterfly changing from an ugly larva to a delicate creature with wings of velvet? Has it been your privilege to watch a battle between a tarantula hawk and a tarantula, or see the robber fly attack the wheel-back bug?

If you have not, you have missed the thrill which comes with first-hand study of insects. You have lost an understanding of the fascination which the cosmos of little things never fails to throw over those who peer deeply into its workings. Books serve a useful purpose, but at best they are but pale reflections of the life they portray. The beauty of the three-cycled life of insects, the brilliance of their transformations, and the savagery of their battles can be experienced only by the observing individuals who are actually on the scene.

There are philosophers who predict the world of insects will some time conquer the human world. Whether or not this is true, at least their proclivities for destruction are great. But we of the present generation may with safety and pleasure become closely acquainted with them,—we can become collectors and breeders of insects, with little trouble and less expense.

A-collecting, then, we will go, not to come back un-



READY FOR OCCUPANTS
The lamp chimney home all fixed up

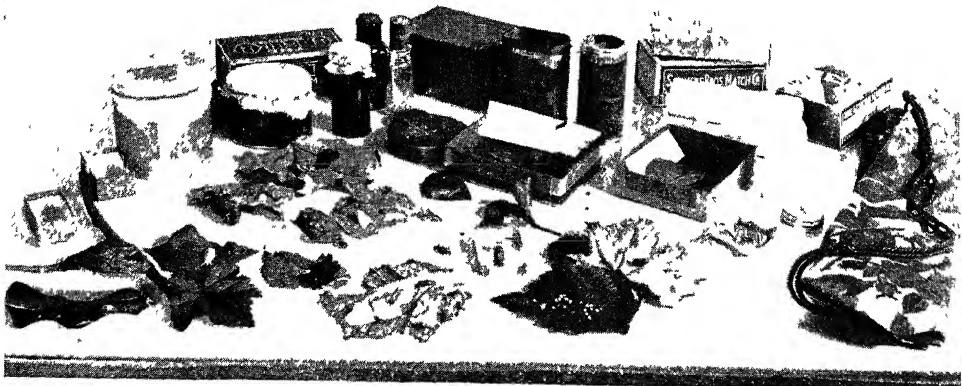
til we have spoils galore, enough to serve as objects of study for several thrilling weeks. But, as with every move of life, this expedition must first secure the necessary equipment, and articles to receive the booty must be prepared.

It is preferable to have a living collection at first, making a complete

study of the life cycle of our captures, then we can build up a pinned one by degrees. Breeding cases are the first adjunct. Six fair-sized flower pots filled with mold and placed on old saucers will serve as bases, and lamp chimneys, covered with cheesecloth secured by rubber bands, will be the daylight prisons for our occupants. Into these we can peer without hindrance, to watch the miracles of life take place.

Now to the field, armed with a few four-inch phials, a dozen match boxes or pill boxes, and a bag. The hunting ground consists of trees and shrubs and their surroundings, and the search will not end until each of the phials and boxes are filled with caterpillars, or, should we be doubly fortunate, with eggs. The eggs are easier to miss, but usually the undersides of leaves, or the inside surfaces of broken pieces of bark, or the holes of trees and telegraph poles will contain a generous

BACK HOME AFTER THE SUCCESSFUL EXPEDITION
Here are the boxes and phials, the sprigs on which caterpillars and eggs were found, and other impedimenta of our collecting habits





BEAUTY FROM UGLINESS
Above is the caterpillar which became the beautiful adult white cabbage butterfly shown at the right

PART OF OUR STUDY
From the chrysalis above, our mature creature will emerge, to crown our efforts with real success

supply Our prizes must not be put away without a leaf or two of the tree or bush from which they were taken, and also a note of the date, locality and name of the host. If the name of the plant is not known, it can be identified later. It is especially necessary that a sprig of the abode of the caterpillars be kept,—it will come in useful later when they are safe in their lamp-chimney homes.

The lids of the boxes containing the eggs must be removed as soon as they are safely home, and the boxes themselves covered with cheesecloth and secured with a rubber band. They should be put in a fairly warm place, and looked at daily until the caterpillars emerge. When this phenomenon has taken place, they are to be housed in the mold in one of the breeding cages, together with a sprig of the plant on which the eggs were found. It should be kept as fresh as possible. Our captured caterpillars should also be treated in the same manner. In this case, all that bear a close resemblance to one another may be put in one cage.

We are now ready for the caterpillars to transform to pupae. They will quite possibly feed for a number of days at first, then one morning we shall find some of them suspended from the sprig. They will not, however, look as we have previously seen them. They will have cut themselves loose from their skin, but remained inside it, and the skin, too, will look different.

They may remain in this state for some time, during which one can observe the wings, segments of the abdomen, and appendages being formed inside. At last the insect is ready to leave its puparium, the old skin is burst asunder, and our mature adult butterfly or moth emerges. If we have several of them we must make

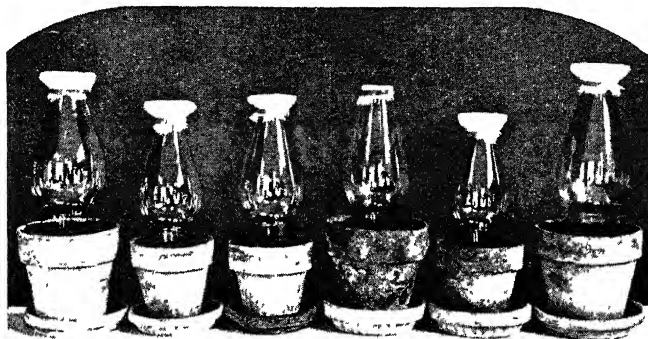
a larger cage and let them have plenty of their food plant on which to lay their eggs. Two of these butterflies may be killed for the permanent or pinned collection either by placing them carefully in a jar containing a piece of rag soaked in chloroform, or by gently, but firmly, pinching their bodies just under the wings. Directions for setting them can be secured from the dealer from whom the setting board is purchased.

Leave the butterflies on the board for about three days, then place them on their pins in a cigar box. We may take the box to the museum to see if we can identify the prizes. Some of the eggs from the living specimens should be preserved and some allowed to hatch into caterpillars. At least two of these latter should be killed by immersion in alcohol, the remainder being allowed to pupate, and two of the pupae likewise should be preserved. Thus we have a complete set illustrative of the life-cycle of our insects.

Such pinned collections must be kept carefully and not allowed to get knocked about, for when the insects are dry, they are extremely brittle, and shaking and jarring will quickly break their appendages. A collection of this kind is of far more use and value than a mere collection of butterflies and beetles, as it shows all the transformations through which the various insects pass and, if proper notes have been finely printed and placed under each insect, one sees at a glance the food plant, locality and date captured, number of days in egg state, caterpillar state, pupal and adult stages. In other

words, we know then what it feeds on, in what locality and the time of year it was most prolific, and the time expended in the complete cycle from egg to adult.

We have a complete record—and at such a slight cost.



HERE THE PRISONS
In these, eggs become caterpillars and then butterflies appear

WATCH THEM WELL
Day by day marvellous changes take place, which we'll watch

JAYS OR CALIFORNIA QUAIL?

Former's Increase Means Death to Game Birds

by Joseph Dixon

of the University of California

ONE morning in July, a California quail was calling excitedly "look-out-there! look out there!" just outside of my window at the Museum. Investigating the cause of the alarm, I found a mother quail leading her brood of downy chicks from the nest. Some of the youngsters were just out of the egg and were not yet dry. The female led her tender brood slowly along, keeping in the shelter of a row of geranium bushes. Progress of the chicks was very slow. Those that had just hatched were only able to toddle for two or three steps at a time and would then fall forward exhausted.

As soon as I came out into the open the mother uttered excited warning notes and rushed toward me, fluttering wildly about in the grass at my feet in an effort to distract my attention from her precious chicks. The chicks responded instantly to their mother's warning by squatting motionless and sticking their necks out parallel to the surface of the ground. I was surprised to find that the father was just as solicitous as the female for the welfare of his brood. It was a beautiful sight to see the hen leading her unusually large brood of nineteen chicks with the cock bringing up the rear.

I photographed the young, which was difficult owing to their constant activity. The topknot or plume was quite noticeable in these day-old chicks when the feathers on the tops of their heads were spread. Some of those that proved to be males had longer plumes than the others, although the longest was not quite one-fourth of an inch in length.

The cock was not content in looking after the youngsters on the ground and in coming up to within four feet of me as I stood watching the flock, but soon flew up and perched in a coast live oak from which vantage



THE VICTIM

Jays pounced on him when he uttered a peep

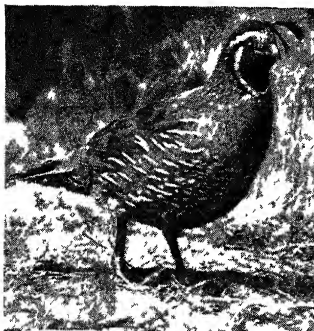
point he watched for danger in all directions.

When the excitement had died down, the mother called her chicks to her and began thrashing out a sprig of chickweed. As the minute green leaves were hurled to one side by her beak two of the chicks rushed in and scrambled greedily for the pieces.

Some of the brood seemed to be missing, however, and wishing to learn what had become of them, I began to search along the row of geraniums that grew beside the Museum. While I was thus watching, an adult California jay hopped out of the geranium bushes

about forty feet away, carrying a live chick in its bill. The baby was fluttering feebly and cheeping frantically but could do nothing. The jay flew down and lit upon the hard path. Here it began pecking and hammering the infant to death as it lay helpless on the hard earthen way. I rushed in and tried to rescue the victim from the jay, but he flew around the corner of the building carrying the quail with him. After feeding his own offspring with the remains, the jay returned and hid until another chick cheeped. Then he at once sneaked into the bushes and, locating the young quail by its call note, proceeded to carry it off. This was repeated so that four out of the nineteen young quail were killed by one California jay in fifteen minutes in spite of all my efforts to drive him off. I then secured a gun and shot the jay. In less than half an hour another jay was after the remnants of the brood. We kept a careful watch and found that within a week the jays had succeeded in killing them all, leaving the two old quail chickless.

On August 5, another family of fourteen downy quail were seen with their parents on the grounds of the Men's Faculty Club on the University campus. On



THE FAMILY JAYS DESTROYED
Neither the cock bird nor the mother, at the right, could save the nineteen little chicks

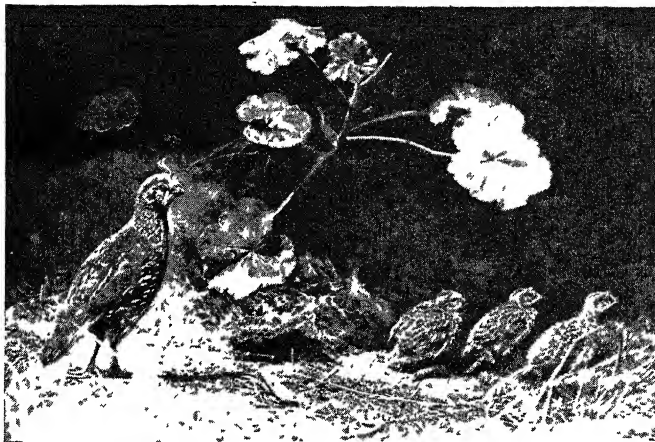


ON THE MARCH

The mother drives her little brood before her, while jays kill stragglers

August 9, I found the family of chicks had been reduced to eight by blue jays which were after them every time they came out from under the sheltering bushes. This cock was also very attentive to the young and, at their first cheep of alarm, would rush in and try to drive off the intruder. Nor were his efforts restricted to his own children, for when another brood of young peeped in alarm, he flew at once to their rescue if within hearing distance. In spite of this watchful care, this brood of fourteen was by August 15 reduced to three chicks.

By August 18 the young quail had grown large enough to be free from attacks of jays. They then spent a good deal



*BUT HARDLY DRY
The youngsters could walk but little without stopping to rest*

of their time taking dust baths and preening their feathers under the watchful eye of their mother.

After thirty years' experience with quail and blue jays in California, it is my conviction that California jays kill more young quail than any other foe.

Indeed, California jays are the worst natural enemies of our quail. Fortunately, the jay is outlawed in California and may be killed at any time. I found by actual experiment on my ranch in San Diego county, that a reduction of the jay population resulted in an increase in the quail and, conversely, that when California jays were allowed to breed an appreciable decrease in the quail population consistently followed.

HERCULES, the DESERT TORTOISE

He Was A Peculiar Fellow And Did Strange Things

by Celeste Gillette

SLOWLY and lazily a desert tortoise walked into our yard far from his native home. Many dogs stood around, barking and jumping at him. The turtle paid no attention to the noise around itself. It walked on into our flower garden.

I called the turtle "Hercules".

Now Hercules was frightfully muddy. I carried him into the house to wash him, and he crawled all over the clean tablecloth in the kitchen. I washed him, and polished his shell with olive oil. Fortunately, I didn't put Hercules in water for he would have disliked it. I found that out afterwards.

Hercules' shell was brown with squares all over it. These squares indicate his age, and show he was very old. His feet were the shape of elephants', and everywhere he went he made great marks.

Daddy asked, "Why don't you kill the turtle so we can have some turtle soup?"

Mother said, "I shall see that this turtle isn't killed."

I fenced in a place in the backyard for the turtle, and made him a box. Hercules

was a peculiar fellow. He walked up and down his little yard unaware of any one. There were only three things that he would eat,—lettuce, avocado, and cantaloup. He would not drink any water.

One day after we had fed him, I forgot to shut the door. In walked our dog. Hercules immediately stopped eating and started to hiss. His pink tongue stuck out and his gray eyes showed anger. He looked more like a snake than a turtle.

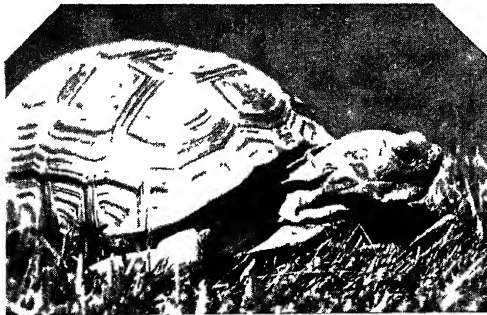
One day in the spring it rained, and Hercules went into his box. He wouldn't come out again until summer.

Then we took him to Grandma's, and she has kept him ever since at her desert home, in Palm Springs.

Now every day Hercules does a strange thing. He climbs up the steps of the side porch, walks around the edge of the porch once, and then he goes back to his box. We have no idea why he does this. The gardener has to watch him so he will not upset himself when he goes up the steps, for if he gets turned up side down he cannot turn over again, and might die.

A CHILD'S PET TORTOISE

Miss Gillette, the author of this article, who is fourteen years of age, cared for this venerable gentleman of the desert.





CHIEF POKAGON

Apostle of Living Beauty

by Edward Allen Hyer

Chief Pokagon, one of the early leaders of conservation, deserves a lasting place among the redmen who worked to save both their people, the white man and the natural life of the country. His vision was greater than that of those who drove him out. As his picture and his biography show, he was kindness and gentility itself,—a truly great man. History will acclaim him more than the past

SOUTHWESTERN Michigan lay still beneath its coat of ice and wind-blown snow. A white solitude stretched to frozen horizons, soft to the touch but steel-armored. What life there was, was silent. The fearful winter of 1876 held the land in its grip. Even within the bark lodge, in the valley where a glacier had once plowed its way, the voices were hushed, subdued. And now but one voice spoke—spoke in measured tones and in words of seeming prophecy.

"They will not come again. We have seen the last of the great flights of the Mene. A few, yes, that we may not too soon forget what we have destroyed . . . It was well, and the wish of the Great Spirit, that we should take some of the Mene each season for our needs, that we should save some for the lean months of winter. But even I, who have seen every manner of death, have never seen such slaughter as that of last summer! The great clouds of birds which painted the sky were not ours or the white man's. The few that we could catch, yes . . . But not all! . . . In every place have I seen the signs of wrath. . . . You! You fools! Did you not follow the white man and learn his evil ways? Did you not lend your aid to the slaughter of the Mene, the pigeons, for his hard, clinking wampum? And what gained you? The wampum of the white man is his. And did it not go back to him? This winter—look! Is there grain stored? Or fish? Was there venison dried? . . . Look! See for yourselves . . . The aged dying for want of food and warmth. Your children and your women weak for the lack of those things you should have gathered in the months of plenty . . . 'Help us slay the pigeons and we will pay you well!' . . . Bah! Indeed you are paid.

"No, the pigeons are gone and I sometimes think

you, too—pot hunters! Bah! You may look until your eyes water in the wind but you will not see the gray clouds rise from the southern skies again. None shall again cry, 'The Mene! The Mene! The Mene-wog!'—I, Pokagon, your chief, have spoken."

Turning from the group he had addressed the chief strode stiffly to the crude doorway of the lodge, stooped and passed through, paused to slip on his deer-hide webs, and tramped off into the sparkling February night, alone with and a part of the silent wilderness.

* * *

A strange man was this Simon Pokagon, full-blooded and hereditary chieftain of the Pokagon band of the Pottawattamie, which were a branch of the Algonquins of the Great Lake region. It was his father, Leopold Pokagon, who entered national history as the Indian who was dickered out of the site of Chicago for three cents an acre.

Simon was born in an Indian village near St. Josephs, Michigan, in 1830, and died January 27, 1899, but a few miles from his birthplace. When he was fourteen years old he could speak but one language, the Pottawattamie. Then he was sent to Notre Dame school in South Bend, Indiana, for three years. He later went to Oberlin College and also studied at Twinsburg, Ohio. All his life, in contact with the white man, he gained the best which civilization had to offer and scorned the rest.

His love and understanding of the wilderness, of which he was truly a part, finds its best expression in his little book, *Queen of the Woods*, a romance of Indian life, which in reality was the romance of his own life. One cannot scan its pages without being conscious of an undertone of music creeping from between the

lines, here the winds sing of sadness as they sigh through the tall pines, there they subtly change their melody to one of promise

Pokagon knew that no craftsman can paint better pictures of Nature than she herself. He often pauses in his narrative "Twilight began to spread its misty curtain o'er the wild. The lake was smooth as polished glass, the shore line and the trees were seen as plainly in the lake as on the land, while in the air above and the lake beneath, bats, like butterflies, flitted about, the swallows in wider circles flew, the night-hawks high above them sailed, rising at times as if to scale the sky, then headlong descending like meteors from above, with a strange hollow sound, while all around the lake the whippoorwills, whose only songs are but their names, a chattering concert gave, and later on, to add new glories to the scene, deep in the lake as heaven is high, appeared the galaxy of glittering stars like diamonds in the vault of blue."

During the earlier part of his life Pokagon had been given more than just reason to be embittered against his white neighbors. As a boy of eight he had seen his tribe driven from their native village and from their inherited lands in northern Indiana by order of Governor Wallace of that state. The white man's liquor killed his

only son. Two drunken white men in a boat capsized his daughter's canoe while she was fishing and she was drowned. His wife, Lonidaw, who witnessed the accident from shore, tried unsuccessfully to effect a rescue and was herself brought half-drowned to the beach by Pokagon's dog. A few weeks afterwards she died of pneumonia contracted from her exposure in the icy waters of the lake.

Yet, in spite of his tragic experiences, in spite of indignities and injustice, Pokagon deliberately adhered to an attitude of friendliness and cooperation with the settlers. He was a peacemaker of the primitive. He steadfastly refused to believe that the many examples of greed and oppression which he witnessed were typical of the white race. And in the end he won not only the respect and admiration of the white man, but also a complete vindication of his policies in the eyes of his fellow tribesmen of the "dusky brow."

Always a kindliness, indulgence, and deep love of life in all of its forms welled from the profound depths of his mind. He was a spiritual kin to that tall, bearded and sorrowing man in Washington who in the early sixties of the last century Pokagon came to know as a friend. It was through the initial aid of Lincoln and subsequently of President Grant that he obtained from the U. S. Government a part of the long overdue payment for the lands sold by his father.

During the latter years of his life Chief Pokagon became internationally known as a writer, poet, and lecturer. He not only recorded many beautiful Indian legends which gave to an alien race an insight into the mind of the red man, the finest of the red men, but he worked persistently and fervently against the evils wrought among his people by the "fire water" of the white trader.

In 1893 Pokagon was present at the opening of the World's Fair in



THE CRY OF A
LOST NATION
*Pokagon's book is
one of the redman's
masterpieces*

POKAGON
FEARED SUCH
SCENES

*The wilderness
passes, making way
for barren slopes*



Chicago He saw places of honor on the great platform accorded to aliens and strangers from every land while he and his followers, the only true Americans, stood in the background, unnoticed and unprovided-for spectators This almost broke his heart As he stood there sadly, a little Indian girl slipped a few wild flowers into his hand He was so deeply stirred that he wrote *The Red Man's Rebuke* and had it published in a booklet made of birchbark It was sold at the Indian Village in the Fair Midway and aroused so much interest that the old chieftain was invited to be a guest of the city on Chicago Day It has been said that no one person contributed more to the interest of "Chicago Day" than did he For he was the master link between the *Shegog-ong* of the Indians and the Chicago of the white men Speaking there before the gathered multitude, in part he said

"Let us not crucify ourselves by going over the bloody trails we have trod in other days, but rather let us look up and rejoice in thankfulness in the present, for out of the storm-cloud of darkness that was around about us we now see helping hands stretched out to aid and strengthen us, above the roar and crash of civilization

We must give up the pursuits of our fathers We must teach our children to give up the bow and arrow, and in place of the gun, we must take the plow, and live as white men do The game is gone forever, it is vain to talk of support from game and fish. . ."

Again, in an address in 1898, near the close of his life, he said, "Tradition, as sacred to us as holy writ, has taught us that our forefathers came to this country from the Atlantic coast Here they found game in great abundance The elk, the buffalo, and the deer stood unalarmed before the hunter's bended bow. Fish swarmed the lakes and streams close to the shore Pigeons, ducks, and geese moved in great clouds through the air, flying so low that they fanned us with their wings, and our boys, whose bows were scarce terror to the crows, would often with their arrows shoot them down

"But our camp fires have all gone out Our council fires blaze no more Our wigwams and they who built them, with their children, have forever disappeared

from this beautiful land, and I alone of all the chiefs am permitted to behold it

"Where cabins and wigwams once stood, now stand churches, schoolhouses, and castles And where we walked or rode in single file along our winding trails, now locomotives scream like some beast of prey, rushing along their iron tracks, drawing after them long rows of palaces with travelers therein, outstripping the flight of eagles in their course "

And in these few words Pokagon wrote the history of North America for full five hundred years

Pokagon was a conservationist before the word was coined, a conservationist by inherent inclination His was the nature that rebelled at useless or excessive destruction, and he lived through the most extended and intense period of wanton consumption of furred, feathered, and forest life in the history of mankind Those were the days when our natural resources were but chattel and plunder for every man, at a time when he who dared to say "stop!" was swamped by the next wave of plunderers

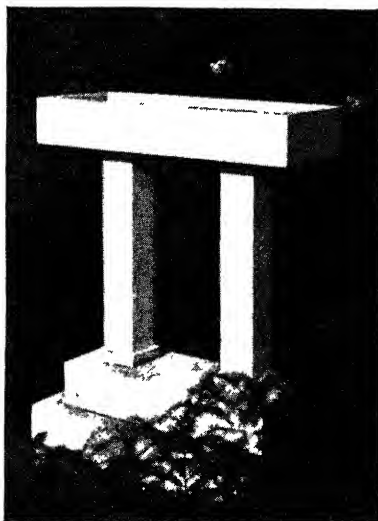
Throughout his life up to the very end, up to the "Manito-gis-gis" (Moon of the Spirit, January), in which he died, there flowed a powerful undertone of love of living beauty. He walked his chosen path, and in those dark years of the last century saw beyond immediate needs and greeds He was one of those few and scattered sparks that survived and glowed, to later burn into the minds of men and emblazon there the words, "Thou shalt not kill wantonly "

And the blaze he started with the aid of other pioneers of conservation kindled into the warm flame of our Audubon Societies, our conservation clubs, and similar organizations, into laws and the courage to enforce them There followed these pioneers who spoke when there was none to heed a national change of attitude towards our wild life and our forests, and through and because of their initial efforts, there have developed a finer and happier understanding of the wilderness and its inhabitants, a more potent and profitable use for them, and like Chief Pokagon, the Pottawattamie, the white man, too, has grown to an appreciation of living beauty, untrammelled and free.

IN MEMORIAM—

IN THE beautiful cemetery at Stockbridge, New Jersey, there are many beautiful stones, flanked by evergreens and well-kept grass, but none more interesting than the bird-bath memorial which stands above the grave of Cecile Bristed Griffith It stands outlined against a great evergreen hedge, and peering above the top of a lower hedge which surrounds it

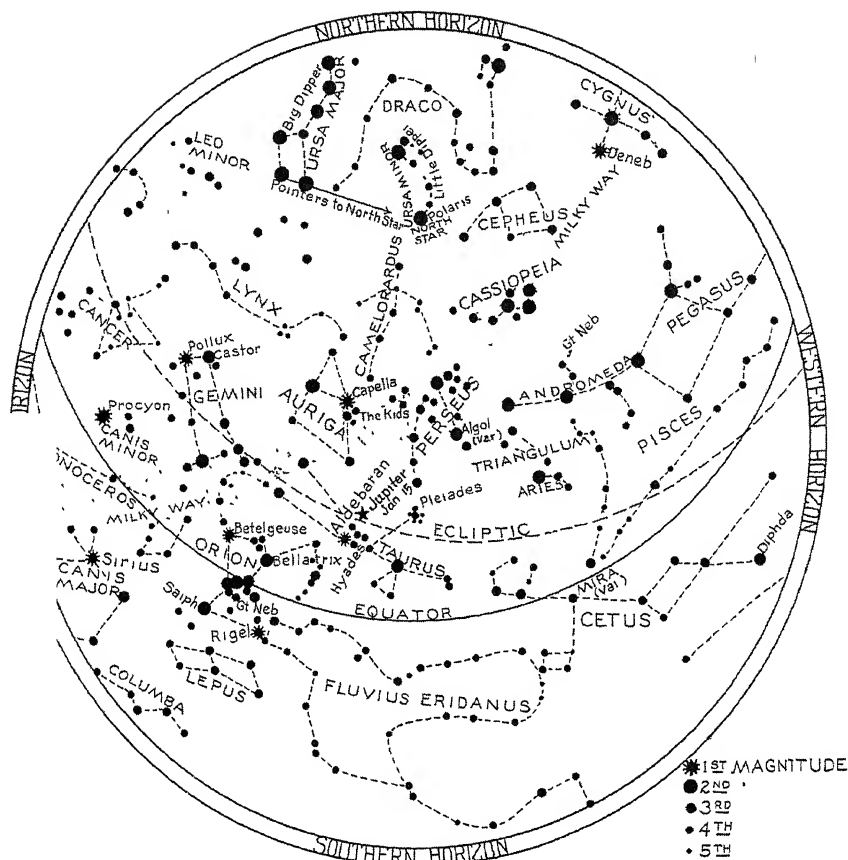
The stone was erected in compliance with the will of Miss Grif-



A Bird-Bath
Tombstone

fith, a lover of the out-of-doors, who requested that the bird bath in her yard be placed on the plot Her friends deemed it wiser to have an exact replica made, and used instead of the original.

If the only immortality is that of living in the memory of future generations, as many believe, Miss Griffith has achieved it And the memory will always be associated with her great love of Nature that links us all with our mother, Earth.



TO USE HOLD OVER THE HEAD WITH TOP TOWARD THE NORTH
 This map is designed for use January 1, 9 p m , January 15, 8 p m , January
 31, 7 p m

MYSTERIES of the SKIES

Astronomical Problems Still Await Solution

by Isabel M. Lewis

THE astronomer of today has made rapid progress in the solution of many problems dealing with the form and structure of the galaxy, or Milky Way, to which our sun belongs, and in the classification of the suns of space as to size, temperature and distribution. He has explored extra-galactic space and made many discoveries. The Magellanic Clouds, the great globular star clusters, the Andromeda Nebula and other "island universes," hundreds of thousands and even millions of light years distant from the earth, have all come under his scrutiny with fruitful results. We now know many facts about dim and distant objects on the outskirts of the visible universe that are hopelessly beyond the reach of the unaided eye, but, only 240,000 miles or so away, that annoying little satellite of ours which refuses to keep to its prescribed path turns always mockingly to-

ward us a pockmarked face whose mystery we cannot solve. The origin of the lunar craters is still in doubt. One may readily find many supporters of the theory that the craters of the moon were formed by the impact of giant meteoric masses in the far distant past, and other just as ardent supporters of the theory that they were caused by tremendous volcanic upheavals.

Dr. Fred Wright has made some remarkably interesting discoveries regarding the nature of the surface rocks of the moon which seem to have some bearing on this problem of the origin of the lunar craters, but this remains still one of the unsolved astronomical puzzles.

Then there is that problem of the length of the Venusian day. Nobody has as yet decisively settled the question whether the planet turns on its axis in a short or long period, though efforts have been made repeatedly

to solve this problem and it is believed to be now only a matter of a few years before the answer will be known. The difficulties have been due to the fact that the planet Venus has no definite surface markings, its dense atmosphere effectually concealing its surface features, though there are some who deny this fact and insist that such markings do exist and that they have seen them. Next to our little satellite, the moon, our sister planet Venus furnishes us with one of the most perplexing of celestial puzzles.

For many years it has been assumed that the outer planets are nearly if not quite gaseous throughout. It has even been suggested that Jupiter may be a semi-sun furnishing its satellites with an appreciable amount of heat, but Dr. Coblentz upset all this a few years ago when he found from radiometric measures of the outer planets that they have surface temperatures somewhere around -140° Centigrade. It is now believed possible that the dense atmospheres of these planets may consist of condensed particles of carbon dioxide or other substances that boil at sub-zero temperatures and that they may have small, solid cores surrounded by layers of ice covered in turn by dense gaseous vapors. Jupiter is undoubtedly the most interesting of the planets to observe telescopically. Changes are always taking place in its atmosphere and its great red spot and tropical disturbances are always an unfailing source of interest. The atmospheric phenomena of the planet have been particularly active for the past few years and the planet is now at its best for observation in the evening. Even a small telescope will show many of its most interesting features such as the four historic moons and the ever-changing phenomena of the equatorial belts.

There is also that old problem of the nature of the canals of Mars. At last their objective reality appears to have been conceded by practically all of the opponents of Dr. Lowell's theories, more than a decade after his death. The remarkable photographs and drawings of the planet made by Drs. Wright and Trumpler at the Lick Observatory, as well as the work of Drs. Slipher, Leland and Coblentz at the Lowell Observatory and Dr. W. H. Pickering on the island of Jamaica have convinced even the most sceptical that life on Mars is a probability rather than a possibility. There is still the problem of the origin of the canals. Whether they are of artificial origin, the work of intelligent beings, or are produced by natural causes such as seasonal storms and floods is another unsolved puzzle.

All of these problems are connected with bodies in our own solar system. We will mention but one exterior to it, the problem of the origin of that greatest of all catastrophes, the outburst of a nova. It is now certain that every star must at some time in its existence have experienced this catastrophe. Some possibly have experienced it several times. Our own sun, therefore, has probably passed through the nova stage at some time in its past, and may do so again in the future. The cause of the outburst of a nova is an unsolved problem so far. A sudden tremendous increase of radiation seems to be the immediate cause of the catastrophe and this in turn may be caused by the release of energy locked up in the atoms within the interior of the star or by a collision with some other celestial object. A wandering body no greater

in size than an asteroid would be capable of causing the mischief, as Prof. W. H. Pickering has pointed out, and there must be many such celestial tramps in interstellar space travelling singly or in swarms.

The greatest of all celestial problems for us, that of the origin of the solar system, may be intimately connected with this hard problem of the origin of novae. Why, one may ask, might not the outburst of a nova result in the birth of a solar system, the expelled substance furnishing the material needed for the formation of planets and their satellites?

These are but a few of the many celestial puzzles that the astronomer seeks to solve. Some he expects will be at least partially solved in the near future, others may never be solved. Yet today one hesitates to say what is possible and what is impossible. Thirty years ago one would have said it was foolish ever to expect to measure the diameters of the stars, but Michelson's interferometer has made this possible in the case of some of the giant stars. Photographs in infra-red and ultra-violet light, and extremely sensitive devices for measuring the surface temperatures of the planets have revealed many facts about neighboring worlds. Other devices or telescopic accessories, now unknown, may lead to the solution of problems that now seem hopeless. There is no branch of science that offers a more fruitful field for investigation and discovery than astronomy of today.

January evening skies in the northern hemisphere surpass all others in beauty. At no other time of year are there so many stars of first and second magnitude above the horizon at the same time. In the eastern half of the sky we have Capella, closely attended by The Kids, close to the meridian at the time for which the sky map is given. Gemini has climbed half-way up from the horizon to the zenith. To the southwest of Gemini is Orion, facing Taurus, The Bull, on the northwest, and followed by Canis Major and Canis Minor, The Greater and Lesser Dog, readily identified by the Dog Stars, Sirius and Procyon. Andromeda and Pegasus now fill most of the western sky. In the northwest will be found the royal pair Cassiopeia and Cepheus and directly west of Capella, and now nearly overhead, lies Perseus, the legendary hero who plays the part of the rescuer of the maiden Andromeda from the sea monster Cetus, in that great celestial drama which involves these six constellations.

Perseus may be easily identified by the long curved line of stars which is known as the Segment in Perseus and is noted for its fine star clusters, and its remarkably variable star Algol, known as the Demon-Star, which fluctuates in brightness in a period of about three days with the greatest regularity, due to the eclipse of the bright star by a large faint companion star revolving around it. Perseus lies in one of the finest portions of the Milky Way which arches high through the zenith in our latitudes at this time of year. Directly south of Perseus lies that famous cluster of the Pleiades in Taurus and not far away to the southwest their companion group, The Hyades, in the forehead of Taurus, the brilliant red Aldebaran representing his fiery eye. Most of the southern sky, to the south of Taurus, is filled by that long winding line of faint stars which marks the course of the

(Continued on page 58)



COMPARE WITH THE TWO HUMANS
Yet the method of culture is contrary to
horticultural usage

ELEPHANT EARS

Medical Field Service School

Claims Championship

by A. B. Nolan

THE MEDICAL Field Service School, at Carlisle Barracks, Carlisle, Pennsylvania, claims the record for growing elephant ears, and will place their elephant ears in competition with any other set in the country.

Elephant ears, strange as it may seem, do not grow on elephants, but bloom under the nomenclature of *Caladium esculentum*. They are plants, and what plants!

The crop of the Medical School is spectacular. The individual leaf shown here measured thirty-two and one-half inches in width, and forty-seven and one-half in length—and yet the plant on which it grows is but an infant. The growth measures twenty-seven feet in length, twelve feet in width, and is seven feet ten inches high. The seven bulbs from which it comes were set out on April 20, of this year.

The method of planting and cultivation is quite simple. A trench about three feet deep and two feet wide



was dug, and filled with fresh horse manure up to about six inches from the top. Rich loam brought the trench up to ground level. The bulbs were placed slightly below the top level of the added loam, but were not planted until all danger of freezing weather had passed. Even light frosts were guarded against by covering at night. Over-heating was likewise avoided, and the bulbs watered often to prevent burning.

The School will accept all challenges on the subject of elephant ears, to be grown in 1930,—nor does it bar sunny California or Florida. As a side line, it will compete also with anyone on cannalilies. The writer has a bed of one hundred and twenty-five of these that are over seven feet tall. The glowing red President variety is the choice for the 1930 cannalily record, and is a strong candidate. There is nothing like competition. The School established records without any—think what it could do if pressed.

(Above) THE RECORD ELEPHANT LEAF

Nearly four feet long and three feet wide, it challenges the world to beat it

(Right) ALL FROM BUT SEVEN BULBS

The School, on the strength of this plant, dares all comers to compete next year





JUST "MUTT"

The Story of a Wild
Hummingbird Tamed

by Lewis W. Walker

COMING FOR THE MAN-MADE NECTAR

"Mutt", the hummer visits the flower held by Dr. Auther Wegeforth, his patron and commissary chief

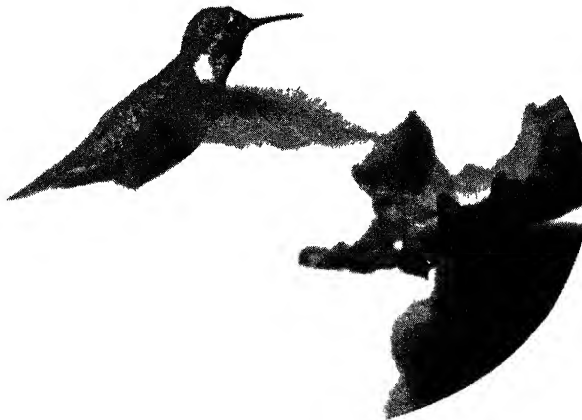
SEVERAL months ago Dr. Auther Wegeforth decided to try to tame the wild hummingbirds which are so numerous about his garden at San Diego, California. He first tried to attract them by using small thimbles and test tubes filled with a mixture of sugar and water. They seemed afraid of these poor, man-made imitations of flowers and refused to notice the nectar within. Small wooden tubes were then used. They also failed. Soon, however, the hibiscus commenced to bloom profusely, and it was found that the hummingbirds devoured with relish syrup placed in the cuplike blossoms.

At the end of several weeks Dr. Wegeforth, through much patience and unceasing effort, had succeeded in taming the birds to a certain degree. He could now approach to within a foot or so without their being disturbed. As time went on, he stopped filling all the flowers, instead, the syrup was placed in just one or two and then at certain times of the day. The birds soon learned their lunch hour. They started to watch for the Doctor, and would hover nearby whenever he approached or entered his garden. At the end of several more weeks, they would not even wait for him to move away from one of the flowers after filling it, instead, their long tongues would be dipping into the blos-

som as the man-made nectar was poured from the bottle. After reaching this stage, he considered he was ready for the final test. Would the hummingbirds come to a flower held in his hand?

He picked one of the red blossoms, and stood close to the hibiscus bush. Mutt, his tamest, appeared like a bullet, hovered for a moment on whirling wings, then disappeared. He returned again just as a bumblebee entered the flower. This seemed too much for him. He was too proud to let an insect show more courage than he had. With a wild dash the bee was dislodged, and the small feathered jewel had taken his place. He looked hesitatingly at the luscious syrup and then greedily devoured it. From then on, the thought of fear in Mutt had completely vanished. He was the king of the garden. He no longer allowed other hummingbirds about his domain.

Now he comes at his master's call of, "Here, Mutt, come on, you big bird!" and after eating or drinking, he flies back to a twig on a tree nearby and sings a high squeaky melody. Some of his notes are far too high for the human ear to detect, but the action of his body, throat, and beak let us know he is still singing, and probably about his victory. He has at last found a human he can trust, and his heart is full with the experience



QUITE UNAFRAID AND JAUNTY

It was only after patient coaxing that the hummingbirds realized who were their friends

THINGS to THINK ABOUT

Lee Highway Signs

Last July several members of the staff of the American Nature Association, led by its President, Mr. Arthur Newton Pack, made a trip over the Lee Highway from Washington by way of Warrenton, Luray and Newmarket, Virginia. A hurried list of the outdoor advertising of various kinds along that beautiful scenic route was made, revealing about 175 signs of varying character and origin. This list was the subject of a letter to Governor Byrd of Virginia and the basis of subsequent publicity.

Recently a more careful check has been made of conditions on that highway, showing that there are even more signs, markers and varied types of outdoor advertising to be found on that route than the original list showed. In contradistinction to many other highways, however, this route is less the victim of the General Outdoor Advertising Company and the so-called organized industry than it is the victim of local advertisers—and signs tacked on trees, fences, stumps and the like.

The region into which this highway penetrates is noted for its caverns and its rolling beautiful country. These two items are listed in the order of their importances in the eyes of the owners of the caverns. With no regard whatsoever for the scenic attraction of the country, the owners of Shenandoah Caverns, Luray Caverns, Massanutten Caverns, several hotels,—notably the Panorama,—have plastered the landscape with atrocious signs. The Shenandoah Caverns, in particular, have some signs inexcusably placed from the point of view of public appreciation of lovely scenery, and so far as we are concerned, after having been offended by this sign, we would take a ten-mile detour over a rough road to avoid going near this particular subterranean wonder.

The Chamber of Commerce of Luray has indulged itself in two immense, rickety, commonplace billboards on its outskirts when it might have more effectively used two really attractive town markers. Trees along the route have their usual allotment of garish markers proclaiming the merits of ginger ales, candy, cigarettes, salt, and the customary advance notices of some impossible roadside stand.

The most consistent user of the billboards on the road is the Standard Oil Company of New Jersey, shouting so loudly about Esso that we bought a gas not advertised on the Lee Highway when we stopped to fill the tank. Most of these organized signs, however, are not in strictly scenic locations and remarkable restraint is in evidence in the vicinity of battlefields, like Bull Run.

Virginia has a clean-up job to do on this highway, which soon will be one of the best leading into its most beautiful scenic region. It is a job which demands the education of Virginia people, owners of caverns and hotels, proprietors of roadside stands and owners of property who barter the beauty of their trees for little or nothing. The Virginia State Chamber of Commerce has a committee at work on the problem. The newspapers of the State are awake to the scenic value they have and to the need of preserving it. Something is going to be

A Page Devoted to Matters of Interest to Conservationists

accomplished in the Old Dominion very soon, and the American Nature Association is happy to be able to play its part in this accomplishment. R W W

Texas Mourning Doves

The doves of Texas, like those of most southern states, have good reason to be called mourning doves. Here is what H. P. Attwater, writing in the *Acco Press* for October, 1927, has to say of this gentle and harmless bird.

"The mourning dove is one of the most numerous of the vanishing game birds of Texas. To facilitate their killing the State has been divided into two zones. The open season for killing doves in the northern zone commences on September first. On this day thousands of sportsmen and boys start out early to shoot these harmless creatures. Then comes the annual Labor Day holiday. From daylight till dark, hosts of pot-hunters tramp all day in the boiling sun, returning at night with their game bags filled with decomposing doves, many of which have to be thrown away. In dry seasons the thirsty doves, flying for a drink of water, are killed by the hundreds by gunners who conceal themselves near tanks and other watering places, and call it great sport.

"From observations in Texas during the past 25 years, I find that doves nest in June, July and August and that their eggs are frequently found in September and occasionally in October. My notes show that their nesting seasons are often interfered with by hail storms, washing rains and high winds, which blow many of their frail nests with eggs and young out of the trees, that many of them begin nesting again later in the season, and that there are many nests with eggs and young in September. Even under normal conditions young doves in September and October are at a great disadvantage. They are not strong on the wing and are unsuspicious, easily approached and, in many instances not old enough to take care of themselves. Under these circumstances it is obvious that the wild doves are in danger of going the way the wild pigeons went."

This, from the pen of a careful observer, a life-long student and friend of our wild birds and animals, should be read and considered carefully by those who advocate opening the season on mourning doves on the first of September.

Seasons for Killing Doves

We greatly regret, for several reasons, to report an error in the note in the July number, page 58, under the title *Nesting Mourning Doves Suffer*. Here we stated that Georgia was not yet committed to the so-called split season, which authorizes the killing of the birds during September, when many of them are still nesting. This statement is no longer true, for since the note

was put in type the State of Georgia, unwilling to be left behind in such matters, has arranged its own shooting season so as to take advantage of the privilege already enjoyed by her sister states under the Federal Regulations. We note further, however, that in Mobile and Baldwin counties, Alabama, which comprise the southern extremity of the State, "to take care of peculiar existing local conditions", the three months open season on doves does not begin until the first of November. We would be interested to learn just what peculiar local conditions are responsible for affording the doves nesting in these counties relief from persecution at a season when their companions in neighboring areas are being sacrificed.

We shall be glad to hear from any of our readers in the South or elsewhere regarding any aspect of this situation. Frankly we are a little prejudiced in favor of mother doves and their nestlings.

A Public Benefactor

For years the 640-acre tract known as the Fassett holding on the Glacier Point Road in the heart of Yosemite National Park has been a stumbling block to the Park Service. It is a beautiful section, containing all species of forest growth found in the park, a fine meadow and a pretty little stream. To have it cut over or made into a development would have ruined the untrammelled scenic beauty of the entire road. But still the Service did not have money enough to buy it.

Due to the generosity of George A. Ball, best known as Vice-President of the Ball Brothers Company of Muncie, Indiana, manufacturers of Mason jars, this tract now rests in the ownership of the government. He paid \$8,000 for it and refused even to let the government donate half. It was his contribution to the preservation of Yosemite beauty.

Mr. Ball is well known in his own state and community as a man who is always willing to cooperate toward civic or state improvements. His last act of public beneficence shows that he has the welfare of the entire nation at heart.

Those who pass along the Glacier Point Road will remember Mr. Ball's gift, which assured one section of it, at least, to perpetual naturalness. Unfortunately there are other tracts of private lands in Yosemite that need similar protection, and they will be endangered unless other Mr. Balls step forward. The government has given the Park Service power to make contracts up to \$3,000,000, as the funds are matched by private donation, but this power is futile unless public spirited givers show themselves. It is only through the action of friends of the Park Service like Mr. Ball that the intolerable private land situation can be cleared up.

Beginning with this issue this page will be a regular feature of Nature Magazine and devoted to the constructive report of matters of current importance in the field of conservation.

NATURE NEWS

AND

Views

A Senator Speaks

"It becomes necessary, therefore, to bring an understanding to our citizenship which will cause it to consider it a crime to rob America of its outdoor lands, and that our nation's welfare and health depend upon the conservation of our woods, waters and wild life." This was the keynote of a recent speech of Senator Harry B Hawes of Missouri, who went on to say "More than seven million hunting licenses and fifteen million fishing licenses are issued each year try to imagine this terrific toll in the destruction of wild life! We have been draining our swamp lands and destroying our forests, destroying wild-life refuges We have been polluting our streams And we are at the same time destroying human life and shortening our years of usefulness Scientists have told us that the yearly toll of black bass is so great that this fish is certain to become extinct within ten years unless the states and nation save it Personally, I think this conservation makes for better citizenship It preserves some of the frontier spirit of our forefathers We must bring back, by purchase, as much of the big outdoors as possible, where strong men in spiritual power find their best nourishment" Who says there is no crisis in conservation?

Investigating Ruffed Grouse

The New England Ruffed Grouse Investigation, sponsored by the Massachusetts Fish and Game Association, is continuing its fourth year of work on the life history of this game bird, giving special emphasis this fall to a study of dyspharynx, one of the most important of its parasites Reports from interested private investigators indicate that the bird is scarce in most parts of New Hampshire, Massachusetts and Connecticut, but increasing in Maine and Canada The committee, headed by Alfred O Gross, at 41 Mt Vernon Street, Boston, Massachusetts, will appreciate specimens, further reports, and also contributions to enable them to carry on their work

Scranton Girl Scouts

The Scranton, Pennsylvania, Girl Scouts are one of the few juvenile groups to publish a magazine entirely devoted to Nature Their publication, issued monthly and edited by Mrs Arthur Greener, the second Deputy Commissioner, is entitled *Outdoor Trails*, and carries on its mimeographed pages interesting Nature notes, suggestions for study, and questions The Scranton scouts have been strong workers for the American Nature Association National Flower campaign, one of them, Miss Susan Cooper, having brought 1500 voters to the polls single handed

A Roadside Achievement

Traveling east along the Boston Post Road, shortly before you enter the city of Stamford, Connecticut, you come upon a stretch of one-half mile of real beauty Your attention is inevitably arrested On one side of the highway, well back, stands a crescent building of attractive architecture and in front a large semicircle of lawn planted with shrubbery and trees which embrace a playing fountain On the other side stretches another crescent, landscaped with flower gardens of varied design and rich with beauty of color Can this be some great estate? No, the sign,—small, artistic and in keeping,—tells you that this is the home of the Condé Nast Press, where are printed Mr Nast's publications and several others, including *Nature Magazine*

Perhaps you will speed on, but you must carry along a picture and impression of real beauty The history of this picture is one of real achievement Some eight years ago, when Mr Nast acquired this half-mile stretch and a small printing plant, there was hardly a tree It was a nest of billboards, poles of various descriptions and rocky waste Those same years have seen the creation of this garden spot, culminating in the placing under ground of all overhead wires along this stretch This final event in roadside betterment was commemorated recently when the last ugly telephone pole fell before an axe wielded by Mrs C Oliver Iselin of the Garden Club of America Now this half mile on the Boston Post Road stands as a notable example of roadside beauty and a monument to the vision of an individual and an industry

Movies and Canada

The increase in \$300,000,000 tourist business from which Canada profits is due to the ways in which moving pictures have "sold" the Dominion, in the opinion of W H Robinson, photographer for the Canadian National Railways He believes that the policy of the railroad leading to the establishment of outdoor film libraries in principal cities, and to their use by groups of Americans and Canadians has been an instrumental factor in directing new interest northward New films of Jasper Park have just been made, the actors in which are Rocky Mountain sheep, goats, bear, deer and other animals Other reels, ready for distribution, will display the wonders of our neighboring nation to any organizations interested in the out-of-doors Inasmuch as Jasper Park is one of the places to be visited by *Nature Magazine* parties in 1930, this announcement has special interest

Learning About Birds

The rising generation of Grand Rapids, Michigan, should include a good batch of ornithologists and a large contingent of intelligent bird lovers after the bird study and coloring contest of the Grand Rapids *Herald* has run its course In this contest attractive prizes are offered by the newspaper to individual youngsters and to schoolrooms for the best showing in coloring the outlined birds published in the newspaper Special honorable mention will be given, and pins indicating membership in the Herald Bird Club will be awarded Such contests are extremely helpful in stimulating a Nature interest

A New Forestry Day

Indicative of the changed attitude of lumbering concerns is the publication of the St Paul and Tacoma Lumber Company of Tacoma, Washington, entitled *Growing New Forests*, which forcefully and attractively points out that every national agency must be rallied to grow new forests for the use of the future "Reforestation is no longer a theory in the Pacific Northwest," the magazine announces "Not the use of old forests but the growing of the new, is the vital question" Excessive taxation and forest fires are labelled the two greatest opponents of successful forest farming How much progress has been made since the days of Michigan cutting, when not even the soil was left!

Save Wolf River

The State Conservation Commission of Wisconsin has gone emphatically on record in opposition to the building of further dams in the region of Wolf River in northeastern Wisconsin The commission contends that further activity of this sort will destroy the beauty of the streams and their surroundings and cause a wholesale destruction of fish life in a territory noted for this life The commission also goes on record as opposed to any dam building in the state until it can be demonstrated that such destruction of beauty and fish life will not result

Carrying On

This brave old apple tree, with half its trunk rotted by disease, still carries on, rejoicing the eye each spring with its beautiful bloom, and later in the summer tempting small boys in the neighborhood to risk colic for its fruit It has been named "Old Faithful" by Grade Eight of the Halsey School, Lake Forest, Ill, who recently reported that it was still making a strong fight Perhaps it might be called the Robert Louis Stevenson tree, since he, likewise, wasted by sickness, brought forth beauty for others to enjoy



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Survey of Animal Problems

Members of the American Nature Association will doubtless be interested to know that a survey of animal problems in National Parks was undertaken, at the invitation of Horace M. Albright, Director of the National Park Service, on July 1, 1929, by Joseph Dixon and George M. Wright. The object of this investigation is to make a survey of animal problems in our various National Parks and to seek means whereby such may be solved. It is proposed that certain outstanding problems, such as the bear and deer problems in Sequoia and Yosemite National Parks, the elk problem in Yellowstone and Yosemite, and the mountain sheep, caribou, wolf, and coyote problems in Mount McKinley, be given major attention at the start.

The relation of predatory animals to other members of the fauna of the parks will be given special attention by Mr. Dixon. Since both of the investigators are members of the committee on economic mammalogy of the American Society of Mammalogists and are much concerned regarding this relation, special emphasis will be placed on this phase of the work.

Mr. Wright, a graduate of the School of Forestry of the University of California, is keenly interested in the ecology of plant life in the parks. As an illustration of one of the problems in this line, we may cite the fact that in several well-known instances in Yosemite the meadows are being encroached upon extensively by a vigorous growth of young yellow pines, with consequent changes in the animal life of the meadows.

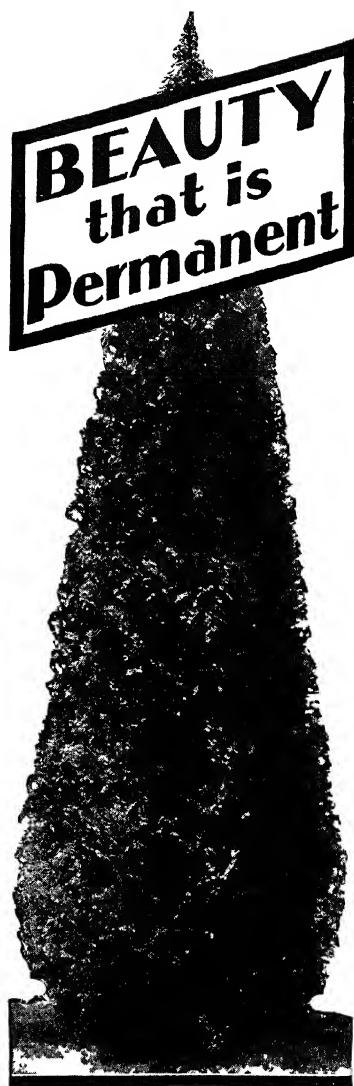
Problems arising through the increasing human occupancy of our national parks and the resultant effect upon the native fauna and flora will also be studied.

This investigation is made possible through the generosity of Mr. Wright, who has assumed the financial responsibility for the work and who, in order to insure the successful completion of the project, has created an independent trust fund under which the work is to be carried out. Headquarters and office for the survey will be maintained at Berkeley, California.

Mr. Wright retains his connection with the National Park Service and is to be its representative in all official matters, with title as Scientific Aide in Investigation. Mr. Dixon retains his title and position as Economic Mammalogist in the Museum of Vertebrate Zoology, University of California. Mr. Dixon and Mr. Wright both expect to concentrate their energies upon the objectives above outlined, they have therefore been granted freedom from their routine duties in the University and in the National Park Service, respectively.

It is planned that facts and conditions as found by personal contact with the living animals in their natural habitats in the parks will be illustrated by a series of both still and motion pictures. Specimens of plants and animals will be collected to insure identification in doubtful cases. It is hoped that the facts thus ascertained will also be useful in the general program for increased activity in the educational work and in the management of animal life in the various national parks.

Full presentation of facts as found, together with recommendations for administrative action, as the work progresses, has been asked for by Director Albright.



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John James Audubon

One of the most fascinating characters in American history is John James Audubon. His impress left upon the history of Nature in the United States is, of course, deep and significant. His works live after him and are cherished and sought by many. But the life of Audubon was lived in troublous times and he worked in the face of great obstacles and against a background of vital interest. Audubon the man, the pioneer, are of almost equal interest with Audubon the artist and the naturalist. These things Edward A. Muschamp has recognized most admirably in his book *Audacious Audubon* just published by Brentano. It is a biography with a broad appeal, and its author has imparted to his writing a sensitive appreciation of the time and tide of Audubon's day. The book is priced at \$3.50.

What of the Universe?

Space, unfortunately, does not permit our giving a review of length to *The Universe Around Us*, by Sir James Jeans, one of the most distinguished of our contemporary scientists. It is futile, therefore, to attempt to discuss the theories of Sir James as set forth in this volume. It must suffice us here to say that he has presented an uncommonly readable and engrossing story of the universe, tracing the development of knowledge about it, digesting the theories of those who attempt to solve some of the mysteries which still confront us and presenting his own views in many instances. Sir James has a remarkable style which opens the pages of his books to the layman, a rare faculty for simple yet comprehensive explanation. We earnestly recommend this book to those who use their heads to think with and who at any time are prone to speculate about the whys and wherefores of the universe. The publishers are The Macmillan Company and the price of the book is \$4.50.

Sky Field Book

To its excellent group of Field Books G. P. Putnam's Sons of New York have added a new volume in *Field Book of the Skies*, by William T. Olcott. It is a presentation of the main facts of modern astronomy and designed to be of practical use to the observer. It is prepared for those who know nothing of astronomy and to teach the beginner how to identify the constellations and the individual stars, and, at the same time, to offer the more experienced observer a practical field book with charts. Finally, the volume seeks to stimulate both a general interest in astronomy and special observation work. It is listed at \$3.50.

They Surely Are

Out in Santa Barbara there is a publisher, one Wallace Hebbard, who has a knack of selecting different and entertaining manuscripts, putting them in fascinating dress and publishing them. He has just done another under the title of *Teachers Are People*. It is the work of Virginia Church, with a foreword by Rupert Hughes and art by Eulalie. It is a collection of poems that everyone who has been to school will enjoy. That provides a large market. It costs \$2.

NATURE IN PRINT

Zoologically Speaking

W. Reid Blair is director and general curator of the New York Zoological Park and as such is eminently qualified to write *In the Zoo*, just published by Charles Scribner's Sons. For twenty-seven years the author has observed the life and habits of wild animals in confinement and these years of experience provide the material for this interesting and entertaining volume. Most of us delight in at least an annual visit to the nearest Zoological Park and Mr. Blair's book will give new interest to the next visit. For the individual far from a Zoo it is as good as a visit, so filled with illustration, anecdote and information is this volume. It is listed at \$2.50.

Burgess Again

The Burgess legend is growing with the publication of each new book, and some day, we hope, it will completely supplant the horrible tales which the Grimm brothers concocted for the awe of children at night. Many long anxious evenings have been spent in nearly every household twenty years back, wondering whether or not the ogre was going to cut off the fair damsel's head, and beside these fearsome stories, the wholesome Nature adventures of Thornton Burgess are as restful and beautiful as a sunset compared with a typhoon. All of which leads us to say that the latest, the *Burgess Seashore Book for Children*, published by Little, Brown and Company for \$3, will delight the heart of any child, inform him of the beauties of the lives of small animals, and teach him love and kindness instead of, as the older book had it, fear and hate.

The General Electric

Steinmetz on the one hand, Coffin on the other—how much have these two alone contributed to the romantic history of the electrical industry in this country! Scientific achievement linked with corporate accomplishment in the development of the General Electric Company constitutes an important phase of today's economic situation. This story is told, ably, simply and engrossingly in *Forty Years with General Electric* by John T. Broderick. It is a distinctly fascinating volume to read beneath the light of the lamp with its tungsten filament, while the radio (tuned down) brings in soft melody and while the electric refrigerator hums maudibly in the kitchen. It gives life and significance to all these things around that we take as matters of course. The book is published by Fort Orange Press, Albany, New York, and sells for \$2.50.

California

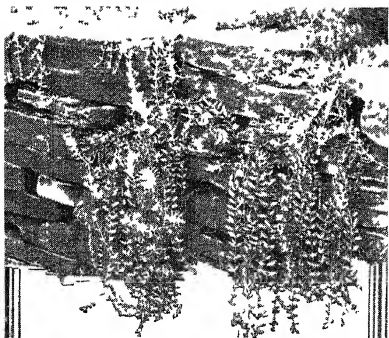
California has been very fortunate in having a literature all of her own—and one inestimably superior to the literature which other states enjoy. The California series of books published by Powell Publishing Company include such books as *Pathfinders*, *Spanish Arcadia*, *Gold Days*, *The Great Trek*, *Songs and Stories*, and *Oxcart to Anplane*, by such writers and compilers as Owen Cockran Coy, Edwin Markham, Robert Glass Cleland and Frank J. Taylor. The series is just begun, and before it is finished, the publishers hope to present every aspect of the state. The latest book in the valuable group is *Outdoor Heritage*, by Harold Child Bryant, naturalist, teacher, editor, conservationist, chief of Yosemite Nature guides. It may not be as spectacular as its companions, but it lays down the reasons for the romance of California by explaining the state itself. Mr. Bryant deals with the animals, the fossils, the mountain formations, the fish, the playgrounds of his native state not as a too-enthusiastic booster, not as a scientific "paper" writer dedicated to prosaics, but as a man imbued with knowledge both of what is readable and what is true. The book, because of the material contained therein, properly belongs at the head of the series, but irrespective of the place given it by its publishers, it deserves reading not only by Californians the world over, but by natives of other states who can be proud of a wonderful section of North America. The price is \$5.

Romance and Skies

The eternal mystery of the heavens will probably cause books by the thousands to be written about it as long as the world shall endure. The romance of it all does not seem to dwindle, no matter how many theories explaining it are given. So the *Romance of the Planets*, written by Mary Proctor, daughter of an astronomer famous for his popular presentation of his subject, probably will be a large seller, since it is written popularly, impresses the reader with the feeling of great space, and touches briefly on the lives of astronomers, their jealousies and their discoveries. The book is easily read, informational, and valuable to one who has not the time to delve in a more completely scientific work. Published by Harpers and Brothers, and priced at \$2.50.

Wild Honey

Samuel Scoville, Jr., lawyer and writer on Nature subjects, is always interesting, and his latest book, *Wild Honey*, an Atlantic Monthly Press publication issued by Little, Brown and Company, has not proved to be an exception to the rule. Mr. Scoville is not primarily a naturalist, by vocation he is a lawyer, yet he brings to all his writings a keen power to describe the out-of-doors and its inhabitants in such a way that his productions read like romance. Herein lies his charm—there is nothing prosaic about his work. Even the most common facts gain a glamor from his pen, the most usual, homely incidents become glowing dramas, such as one expects fiction writers to conceive. *Wild Honey* will create new pictures of the out-of-doors. The price is \$3.



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Sample Line for the Asking

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Beginning with the February issue, this department will be edited by Mr. Romaine B. Ware, nationally-known writer on garden subjects. The department will be presented under the general title of "Planting the Garden—Month by Month," and will contain helpful suggestions and directions for the gardener. Mr. Ware's experience in the garden field is nation-wide and his monthly article will be equally general in usefulness.

Now that the winds are about us, and the snow, it's much more pleasant to sit by the fire and dream about next year's garden, than to get out and be doing. Fortunately, Nature cooperates for once, and all that will call us out-of-doors will be the broken trellises that need mending, mulching, the covering of plants that are liable to freeze, and pruning.

* * *

Of course, there are hot-beds to make, and bulbs to inspect, to make sure they are not rotting, as well as the annual inspection of all the equipment. Be sure that everything is ready for instant use when spring comes. "Show me a man's tools, and I'll tell you what kind of a workman he is."

* * *

The big feature of the month, however, is ordering and planning. No garden stands still—it either goes forward or back. It will have been well if notes have been taken during the summer months. Perhaps in July the color combination did not look right, and a scribble to this effect will enable you to improve it next July. Perhaps you did not have enough evergreens for background. Perhaps it is time to add a water pool, or a rock garden, or rose bed.

* * *

A number of books have lately come out which will not only admirably serve as Christmas gifts for your gardening friends, but also will give suggestions worth following in 1930. A few of them are listed below and may be ordered through Nature Magazine.

Patio Gardens, by Helen M. Fox Macmillan, \$6

American Plants for American Gardens, by Edith A. Roberts and Elsa Rehmann Macmillan, \$2

Gardening in the Lower South, by H. Harold Hume Macmillan, \$5

Dahlias, by F. F. Rockwell Macmillan, \$1

Lawns, by F. F. Rockwell Macmillan, \$1

The Annuals of Flowerland, by Alice T. A. Quackenbush Macmillan, \$1.50

Pioneers of Plant Study, by Ellison Hawks Macmillan, \$4

Wild Flowers and Ferns in Their Homes and in Our Gardens, by Herbert Durand G. P. Putnam's Sons, \$3.50

My Wild Flower Garden, by Herbert Durand G. P. Putnam's Sons, \$2.50

Garden Cinderellas, by Helen M. Fox Macmillan, \$5

Here is your copy



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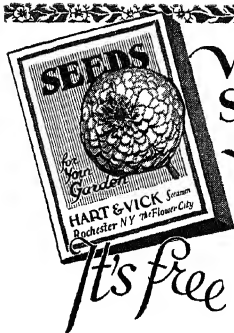
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Roof Gardening, by Ida Mellen De La Mare, \$1.25

The Book of Shrubs, by Alfred C. Hottes De La Mare, \$3.15

Water Gardens and Gold Fish, by Robert V. Sawyer and Edwin H. Perkins De La Mare, \$1.65

City and Suburban Gardening, by Chesla C. Sherlock De La Mare, \$2

Gardening under Glass, by F. F. Rockwell, revised by T. A. Weston De La Mare, \$2.65

Garden Guide—the Amateur Gardeners' Handbook De La Mare, up to \$1.65

The Book of Annuals, the Book of Perennials, A Little Book of Climbing Plants, all by Alfred C. Hottes De La Mare, \$1.65, \$1.65, \$1.90

Practical Landscape Gardening, by Robert B. Cridland De La Mare, \$2.65

The Book of Water Gardening, by Peter Bisset De La Mare, \$5

Practical Plant Propagation, by Alfred C. Hottes De La Mare, \$2.15

Irises, by F. F. Rockwell Macmillan, \$1. The National Garden Association books, The Garden Library, which carries with the purchase price the right to call on the association at any time for advice. National Garden Association, Garden City, N. Y. C., \$9.35

These are not all the books that are worth-while, but each one in the list will be a valuable adjunct to the garden library.

Relative to garden planning, the movement is swinging rapidly toward wild flower gardening and away from the more formal and artistic "arrangements" of years back. The idea suggested by Miss Whitney of a "Rescue the Perishing" garden, made up of plants taken from the sites of excavation or road construction, may be successfully utilized next year.

It was recommended last year to plant an evergreen or two on the front lawn to serve as a living Christmas tree. If the suggestion was followed, the young tree should be old enough to support a few colored lights. No matter how tiny it is, it will add a wonderful note of jollity to a season in which joy should be unconfined.

The gardener's mind is very apt to be poring over ideas for Christmas presents rather than for gardens at this season. Do not forget that garden books, bulbs, shrubs, garden tools, subscriptions to gardening and out-of-door magazines will always be acceptable presents.

How do plants get their names? Those who have puzzled over scientific nomenclature have often wondered. Here, however, are the sources of a few.

Gladiolus comes from the Latin diminutive of the word for "sword," and so might be called the "sword lily." The rhododendron was named from two Greek words, signifying "rose tree"—a good name, is it not? Phlox is literal Greek for "flame" (from the color of some of the flowers) and corresponds to the German flammenblume, or "flame flower." Aster is literal Latin for "star," and survives in English in asterisk, which is the name for the "star mark" in typography (*). The daisy was named after the sun, or "day's eye," coming from Anglo-Saxon words of that significance. The geranium is "crane's bill," or "stork's bill."



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through Latin from a Greek word meaning "crane" A heliotrope is a flower that, from the Greek derivation of its name, "turns toward the sun"—in other words, it is a botanical sun-dial Chrysanthemum comes from the Greek words meaning "gold flower"

Then there is marigold, which was named after the Virgin Mary, for its name means "Mary's gold" Other flowers have been named after the Virgin Mary in popular parlance, but the honor is almost forgotten today For example, there is the lady's slipper, which is merely a shortening of "our lady's slipper," and "our lady" was, of course, the Virgin Mary

SNOWFLAKES

(Continued from page 21)

actly alike It is true that in a single storm Nature often uses a very similar pattern, but of a sudden, tiring, she surprises the world by tossing down a snow flake utterly different in all ways from any she has designed before

Do you live in a northern climate? If so, have you seen those minute daggers of ice, all glittering and sparkling, that fill the winter early air? Too light to fall, they dance with Jack Frost under a clear, blue sky, inviting you to join their merry fun by stamping your feet The dancers are bits of dust floating in the air Nature covers these with water, and freezes them into "ice spicules", or "ice needles", and in capricious mood she stings your cheeks with their sharp points

Many motifs used in art and industry have come to us straight from the treasure of the snow Schools of design make use of the crystal's architecture It may be that your silk gown holds a snow flake's delicately etched markings, for the silk manufacturers call upon the crystal's aid Many artists have been inspired to use its form and tracings for stained glass windows, or for mosaics Jewelers frequently copy the snow crystal in filigree and more solid jewelry, metal workers have designed metal grilling from it, decorations for churches and other buildings sometimes owe their origin to the snow flake in all its varied beauty Perhaps we never realize how great a friend we have in the tiny snow-messenger from the sky

Frogs and Flies

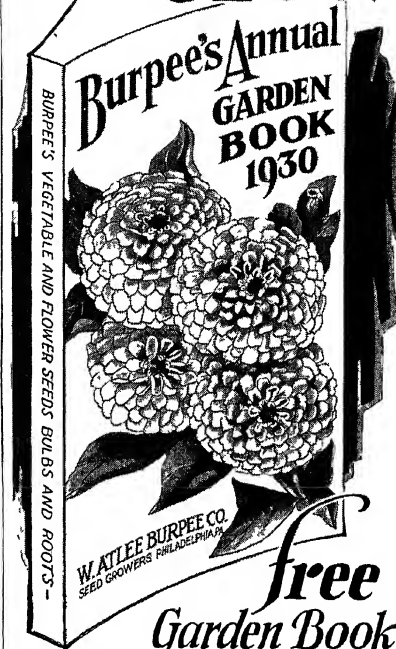
The statement of a Philadelphia columnist that frogs do not eat flies has elicited reply from William Harper Davis of New York, who says, anent the subject "Frequently I have seen frogs snap at the brilliant wild flies which buzz among the sedges by the borders of a stream A frog will snap at anything that shows life Even frogs which have not taken flies in Nature will take them in an aquarium or vivarium A tadpole scarcely drops its tail before its relish for flies is displayed. This applies to all the species of frogs I have tried anywhere"

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MYSTERIES OF THE SKIES

(Continued from page 48)

Sky River, Eridanus, which terminates far below our horizon in the brilliant Achernar, which means End-of-the-River.

Among the planets, Venus, Mars and Saturn are all in Sagittarius in the morning sky but too close to the sun to be seen. Jupiter is in Taurus, north of The Hyades and a magnificent object in the evening sky. This is an exceptionally favorable time to view the giant planet and his interesting belts and satellites in the telescope. Mercury reaches greatest eastern elongation on January 5 and may possibly be seen for a few days about this time directly after sunset low in the southwest, but this is not a favorable time to observe this planet.

And so the panorama of the heavens mightily unfolds itself, ever urging us toward the solution of the Great Plan.

A Swallowing Feat

A rather unusual bit of gastronomic acrobatics was witnessed last summer by Miss Elizabeth Smith and her friends near a highway in Idaho. A huge rattlesnake was being swallowed by a much smaller snake, a blue racer, who patiently was enjoying his meal. The rattler was limp and practically dead, while the racer, very much alive, gulped pleasurably, although with difficulty, as he slowly devoured whole his larger adversary.

Save the Huckleberry

The Washington State Society for the Conservation of Wild Flowers and Tree Planting, now having made great progress in the saving of the famous holly of the Webfoot State, assumes the position of godmother over the evergreen huckleberry, which does not grow in any other state except Oregon and California. The plea for moderate cutting, careful and wise selection, and even the complete cessation of gathering should find an answer in the Washingtonians.

More Albino Trout

In the March issue, we told about the eighteen albino trout swimming around in the Ocean Park fish hatchery near Newport, Oregon. C. B. Rychman, the manager, writes us that the eighteen have become 3,000 true albino fry, perfectly white. All crosses with regular brook-trout eggs, however, produced black fry, proving that the albino is a recessive type. Nature Magazine and Mr. Rychman would both appreciate hearing of any like experiments in fish pigmentation.

Exchange Specimens

Mr. James L. Ortega, whose address is R. F. D. 4, Box 171, Santa Ana, California, is interested in getting in touch with residents of Latin-American countries for the purpose of exchanging specimens and notes on natural history.

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NATURE MAGAZINE when answering advertisements

Miss Dayton Passes

Miss Dora Dayton, secretary of the Nature Club of Southern California, passed away early in October at her home in Los Angeles, and the entire Nature-loving world will mourn her. She was a beautiful friend both of human beings and the out-of-doors, her type was all too rare. It was only fitting that the Nature Club should conduct services, which took place at the Little Church of the Flowers, at Forest Lawn Cemetery, and it was only fitting, too, that the Club should send to her and its friends an engraving of her last wish—"Let my memorial be an evergreen memory in your hearts." It always will be.

Washington Cherries

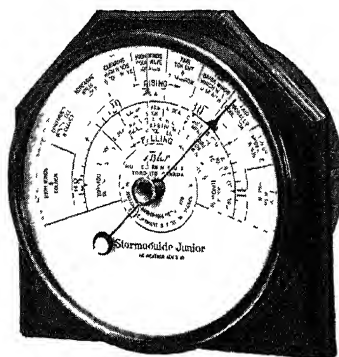
The famous Japanese cherry trees around the Tidal Basin in the Nation's Capital, the gift of the Japanese government and still the pride of natives and tourists despite the great damage done them by a deluge in the summer of 1928, are the subject of a dainty Japanese booklet prepared by Masao Yoshikawa, formerly of the Department of Agriculture. The book contains ten three-color plates of different cherry species, numerous photographs of scenes along the Potomac, and the history and botany of the Park trees, together with a short account of the romance of the cherry blossoms, compiled by Mr. Yoshikawa from beautiful Japanese legends and poems. As the booklet proclaims, it is indeed one of the best souvenirs of the Capital.

The Pocono Mountains

All those who have come to know and love the Poconos, give ear! To you Carroll B. Tyson has dedicated his book, *The Poconos*, and between its covers has enshrined the beauty, the lore and the charm of these northeastern Pennsylvania mountains. "There is an indefinable something about the Poconos that draws you to them—makes you want to stay or to go again and again until you have quite succumbed to their charm," writes the author. This same thing, in essence, has been written of other mountains and other parts of the world. Yet in this volume the author presents a strong brief in support of his declaration and his writing will find a welcome from many who share his affection for these hills and mountains. The publishers are Innes and Sons, Philadelphia.

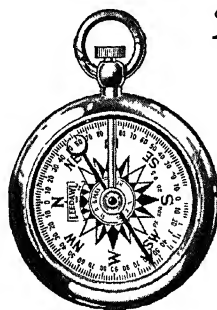
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Hamilton County Nature

Indiana seems to be honeycombed with Nature lovers, and another outdoor group the Hamilton County Nature Study Club, with headquarters at Noblesville, has just announced its program for the rest of the year. It involves doing many Nature-interesting things under the light of the different "moons"—the Planting Moon, the Rose Moon, the Hunting Moon and the rest. A bird calendar is being kept by each member, and each is requested to plant one tree a year. J. O. Clarke is President, Perry Bray, Vice-president, and Jean Clarke, Secretary-treasurer.

Dry Weather Appetites

Dr. George Roberts, of Lake Forest, Illinois, reports an interesting observation regarding the appetites of robins for humanly distributed food during the past dry summer. More apples and grapes have been devoured by them than ever before, he relates, and they gobbled up the suet he puts out more quickly than usual. He believes the dry weather kept the worms from coming to the surface, and the birds did not get their usual diet.

Philadelphia Gardens

A volume of distinction for the library table is amply furnished in a beautiful deluxe publication of Dorrance and Company, Philadelphia, entitled *Portraits of Philadelphia Gardens*. This is the joint work of Louise and James Bush-Brown, the former director of the School of Horticulture for Women, and the latter a landscape architect. They have gathered together some fascinating pictures of some twenty-five outstanding gardens and they are produced together with attractive descriptive matter. The whole volume is a fine piece of work, also, from the printing point of view and the ensemble is a volume practical, beautiful and ornamental.

For the Dogs

Will Judy, editor of Dog World Magazine and many articles and stories on dogs, has brought out a new edition of *Kennel Building and Plans* with new plans and theories for the comfortable housing of dogs, which will aid both the fancier and the one-dog man. After reading it, you will wonder why your dog ever stays with you at all, in the shack you have made for him out of a packing box. The price is \$1, and the publisher, Judy Publishing Company, Chicago.

Jack and Jill

Besides running an excellent Nature Study Department in the schools of Los Angeles, Dr. Charles Lincoln Edwards likes to write stories for young people, always, of course, with the Nature thread running through them. His most recent contribution along this line is *Jack and Jill and Indian John, a Chumash Chief*, and in this little story the youngsters learn a lot from John and it's great fun.



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Mounted Birds and Animals

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The Bird Book

In 1913, under the auspices of *The Farm Journal*, the late Wilmer Atkinson and Charles P. Shoffner started the Liberty Bell Bird Club, dedicated to saving our birds and involving nothing more than a pledge to do so The success of this idea has been notable and nearly one million friends of the birds have enrolled Having been so long and actively in this field, Mr. Shoffner has found that while there are many excellent bird books on the market, there is one method of handling that has been more or less overlooked He, therefore, has essayed something rather different in his volume, *The Bird Book* It is not a technical book but rather a volume to inspire and suggest Each chapter is equipped at the end with interesting questions and answers, useful for the teacher, the parent and the youngster We have never seen a bird book like this one and we feel that it is very much needed The publisher, Richard Mansford of New York, has priced the book low at two dollars

Views on Evolution

Here is a book that may have little sale in Arkansas, Tennessee and other points of like tendency Mayhap we will even bring down censure upon our heads for being so bold as to review such a notable volume and to express the hope that it be widely read for the thought-stimulant it contains The book is *Creation by Evolution* Under the editorship of Frances Mason, with a foreword by Henry Fairfield Osborn and an introduction by Sir Charles S. Sherrington, twenty-four leading scientists have set forth in simple form their views on evolution and their reasons for their conclusions The book is a forum in itself and a credit to the one who conceived it, Mrs. Mason, and to its publishers, The Macmillan Company Its price is five dollars

Fourth Grade Reader

There seems to be a growing tendency among school readers, especially those adapted for the first four grades, to draw a major portion of the material from Nature literature The Fourth Reader, in the series of the Rosary Readers, written by Sister Mary Henry and Sister Mary Arthur, and published by Ginn and Company, illustrates this tendency Moreover, the Nature in the book appears to be unusually accurate, and the animal fiction stories not too heavily overdrawn The poetry especially has been selected with great discrimination, and the prose, written by the compilers, is excellent

Science Series Grows

Book Four has now been added to the excellent series of science textbooks edited by Dr. Frank W. Ballou, published by D. Appleton and Company, New York, and appearing under the group title, *Elementary Science by Grades* This latest volume is the combined work of Ellis C. Persing and Edward E. Wildman, and maintains the fine standard set by its predecessors in this series

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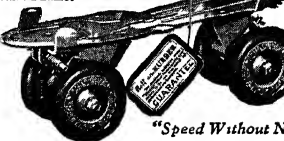
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Mr. Finley Lectures

William L. Finley, American Nature Association lecturer, is looking forward to a busy season, and members of the association in different parts of the country will doubtless wish to know his appointments. In the December issue, the dates down to January 19 were given. Some time between January 20 and 25, Mr. Finley will be in Chicago, and thenceforth Bowling Green, Ohio, January 27, Mishawaka, Ind., 28, Canton, Ohio, 29, Valparaiso, Ind., 30, Sewickley, Penna., February 3, New Wilmington, Penna., 4, Philadelphia, 7, Buffalo, N. Y., 8, Coatesville, Penna., 9, Montclair, N. J., 17, Pittsburgh, Penna., 19 and 20, Reading, Penna., 21, Memphis, Tenn., 26 and 27, Asheville, N. C., March 1, Buffalo, N. Y., 7, Detroit, Michigan, 11, Springfield, Ohio, 14, and Buffalo, N. Y., March 15. He will lecture in Boston, Mass., and vicinity between February 10 and 15 and March 3 and 8, but the definite dates are not yet set.

A Young Burroughs

The impression of a none-too-quiet civilization upon the sensitive mind of Kimberley Johnson, 11-year old son of Mrs. Rhea Kimberley Johnson, author of *White Mice*, which appeared in January, 1929.

"I once lived on a road where one could find peace and God. They came with monsters made of steel and iron. They called them steam shovels and trucks. They cut down God's own trees and wiped out long strips of nature. They brought stuff called tar. They made what they called a road for smaller monsters to travel on. They call these automobiles. And now I live in hell!"

Wild Rose Lauded

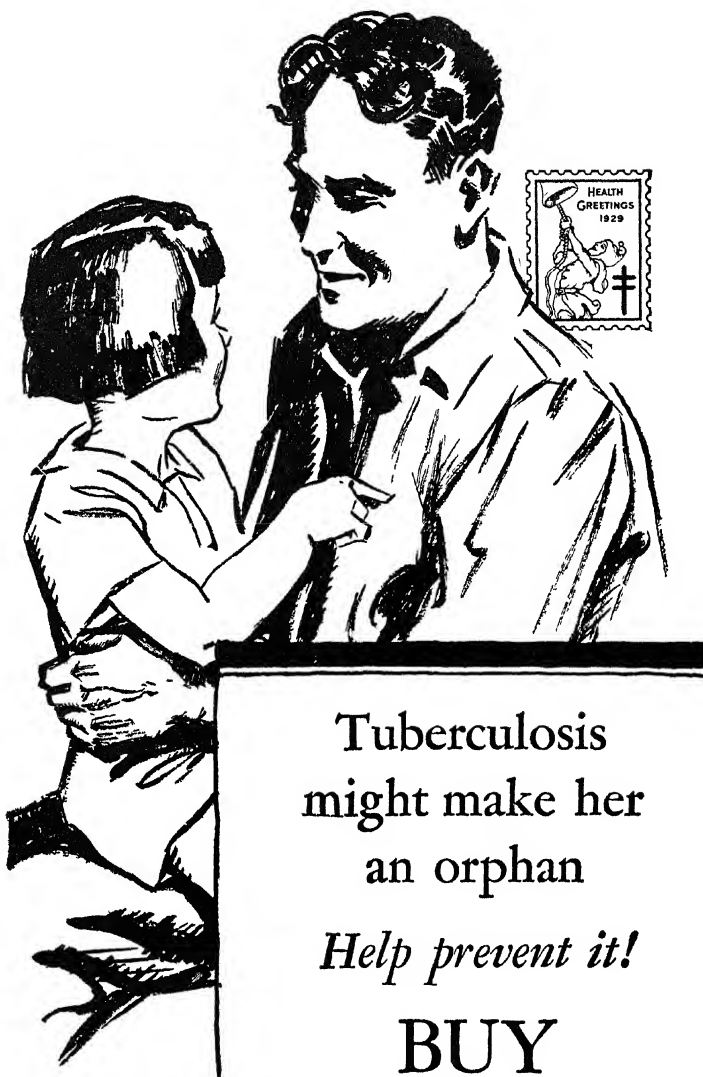
The leading candidate in the national flower campaign, the wild rose, has been favored with a song, entitled a "Song to a Flower", written by F. Avanius Wirén, and sung by her over the radio on several occasions. Miss Wirén has been working steadfastly for her candidate through the voting period. The M. Page Music Publishing Company, 220 West 42nd Street, is the publisher.

Praying Mantis Preys

One morning a commotion was heard in the back yard of the house of Charles E. Graves at McKinney, Texas, and the crowd of children responding to it, found a hummingbird limp and exhausted in the toils of a praying mantis. He was being held about the neck just back of the head. Evidently, he had come too close to a zinnia upon which the mantis was resting, and had been attacked. After the victim had been released, he recovered, but kept away from the zinnias. This is a most unusual example of insect and bird conflict.

Exchanges Wanted

Miss Florida Rivard, of Route 8, Yakima, Washington, is looking for the opportunity to make exchanges with botany students in foreign countries and in other sections of the United States and Canada for the purposes of making a notebook. She prefers to exchange pressed leaves and flowers.



Tuberculosis
might make her
an orphan

Help prevent it!

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A SIMPLE Scientific System of Christian thought and life. Gives Christianity the power of godliness as well as the form. Puts into it the living vibrant force which brings prosperity, love, achievement, health, happiness, peace and more abundant life. Not a religion nor a sect, but a movement within the churches, loyal to their work and ministry. Based squarely upon the teachings of Jesus as verified, explained and practically applied by modern scientific Psychology. Prepared by Judge Daniel A. Simmons, world-famous psychologist, jurist, author and teacher. Judge Simmons has set forth the fundamental working principles of Christian Psychology in a wonderful lecture entitled "The Kingdom of God." This lecture will be **SENT COMPLETE AND FREE**

as a work of loving personal service on our part, rendered in the name and spirit of Him who said: "Freely ye have received, freely give." Send for it today.
THE AMERICAN INSTITUTE OF PSYCHOLOGY
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A Steady Caller

A whip-poor-will who returned to the vicinity of the home of F. C. Penfield at Topeka, Kansas, for four successive seasons, on his way south is reported by Mr. Penfield. It was October 1, 1926, that he made his first call, and when found was snuggled down asleep on the porch railing. In 1927

he chose the same spot, the same time, and the same position, but in 1928, he perched on the top rail of the next door neighbor's grape arbor. This year, again on October 1, he was back in the first chosen place. Each time he remained until four or five o'clock before continuing on his way south. The bird was identified by certain characteristic marks.

FORESTS AND MANKIND

By
CHARLES LATHROP PACK

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AND
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Forester

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Flower Protection

Measures, too long coming, to preserve some of the fast disappearing native flowers of southern California have been adopted by the counties of Los Angeles, Riverside, Imperial, San Diego and San Bernardino by the enactment of ordinances. Each of these make the picking of certain plants a misdemeanor, punishable by fine or imprisonment, or both, and will have considerable effect throughout the state. While such ordinances are necessary, of course, yet the difficulties in enforcing them are almost insuperable, and the complementary educational campaigns such as conducted by the Nature Club of Southern California are necessary. It is not enough to say, "don't", and "mustn't touch", individuals must be inculcated with such love for flowers and such respect for the rights of others as to be content to look, and then pass on.

Real Protection

Among the Nature organizations which are working not for organization but for the establishment of better safeguards for wild life and flora is the LaRue Homes Nature Lovers' League, the president of which was the late Waldron DeWitt Miller, of the American Museum of Natural History. It has been the supporter and instigator of a number of conservation bills in New Jersey, its home state, and has done active duty in the schools to promote wild flower preservation, issuing pamphlets, bulletins, "honor" cards for classes that have not picked wild flowers for a year, and other literature on conservation. Its president was, before his death, a recognized conservationist with none of the conventional compromises in his system.

Birds and Wires

That power companies are as anxious as bird lovers that birds keep off their cross-country lines is not generally known, but is true. Short-circuits not only kill the bird, but cause expensive breakdowns in the line. Steps have been taken abroad to further insulate the conductors, and undoubtedly these plans will be followed in this country. The slogan for this campaign will be "Save the birds and the Current!"

Planting Shelters

Rural communities suffer greatly during the winter, especially on the plains, from snow which fills their roads and prevents transportation not only from town to town, but from neighbor to neighbor. The U. S. Department of Agriculture has issued a bulletin, *Planting and Care of Shelter Belts on the Northern Great Plains*, which may be of use to farmers and orchardists. It appears as Farmers' Bulletin No. 1603.

New League Manager

Mr. M. K. Reckord of Washington, D. C. has been appointed the General Manager of the Izaak Walton League of America, to succeed the late Fred H. Doellner. He was formerly on the National Staff of the American Red Cross, being director of activities in the West Indies, and of the First Aid and Life Saving Service.



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THE NATIONAL FLOWER VOTE

Owing to a heavy poll during the past few weeks, and to reports from all over the country that organized campaigns could not get out the vote completely before December had begun, it was agreed to allow votes to come in until January 1, instead of December 1, as previously announced. The American Nature Association will announce the people's choice in the March issue of Nature Magazine.

The totals to date of closing the magazine are as follows:

Wild Rose	404,025
Columbine	165,773
Goldenrod	72,961
Violet	88,187
Phlox	30,132
Daisy	16,202
Dogwood	7,911
American Beauty Rose	21,044
Mountain Laurel	11,672
Scattering	28,367
Total	846,274

Kentucky Botanic Gardens

The botanic gardens of the University of Kentucky are nearly completed, after a year of active work. Harry Lindberg, the landscape gardener reports. The plot is divided into three parts, with rock garden, garden for plants needing special soil, and a plot for native trees and shrubs. It is hoped to contain ultimately every type of plant which will grow in the climate.

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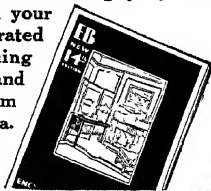
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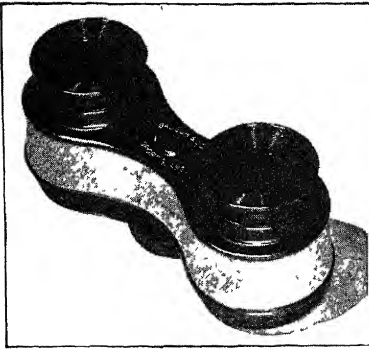
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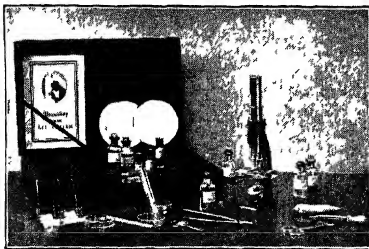
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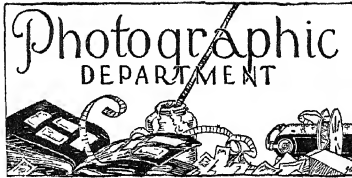
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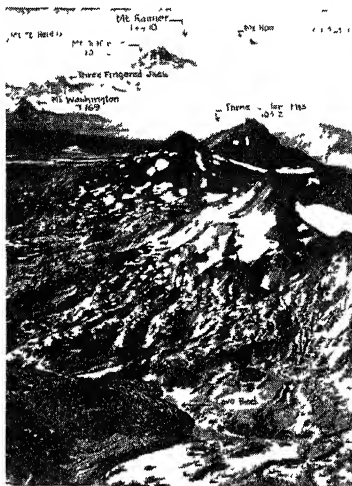
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REPORT of high photographic interest was made recently to the scientists of the Eastman Kodak Company, Folmer Graflex Corporation and the Bausch and Lomb Optical Company by Captain A. W. Stevens of the U. S. Army Air Corps following his successful taking of a photograph of Mount Rainier from a point 227 miles distant from the peak. Captain Stevens, who is head of the photographic branch of the Air Corps at Wright Field, Dayton, Ohio, by this feat beat his own long range photography record by fifty miles.



The picture above was made at an altitude of 17,000 feet above a landmark that could be identified on a map. The eye could not see the mountain, but the film of the camera, sensitive to the infra-red light rays which penetrate the haze and smoke could out-see the human eye. When Captain Stevens shot the picture all he could do was to point in the direction of Mount Rainier and wait until the film was developed to see whether he had gotten it. He believes that the trick can be done at even a greater distance with the same equipment. It is also felt that this piece of aerial, long-distance photography achievement is a distinct contribution to military photography. Other valuable data, specifically with respect to the curvature of light rays around the surface of the earth, may also result.

* * *

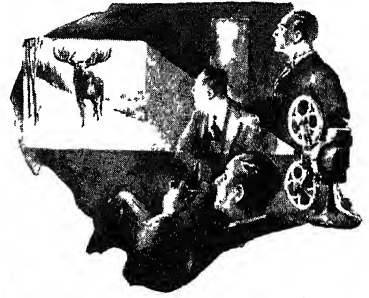
The Eastman Kodak Company announces that it still has a few copies of "An Amateur Photoplay in the Making" available to owners of motion picture cameras. This helpful booklet will be sent on request.

* * *

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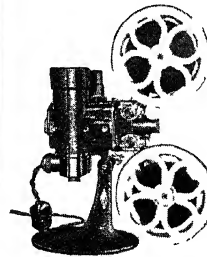
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beaucoup.	bow-koo
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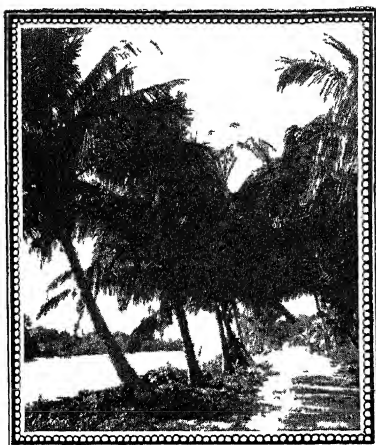
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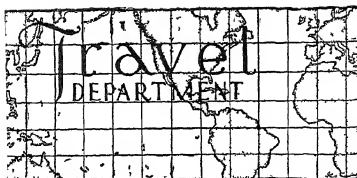
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ELSFWHERE in this issue are announced the proposed Nature Magazine trips for the summer of 1930, to several National Parks. To those seeking something different in travel from the ordinary tour, and yet something retaining its best features, together with the best features of traveling alone, the plans of the American Nature Association should be very welcome. Small parties, selected carefully from applicants whose very applications are indications of a community interest, will go out from Chicago, under the care of a personal host whose function is not merely to pay bills and care for baggage, but also to do everything in his power to mould a congenial group, they will be met at the park entrance by a National Park naturalist, himself trained in the art of fellowship and helpfulness, they will go through the most beautiful country in America as far as possible from too pressing contact with civilization, and see its wonders leisurely. The trips are not for mollycoddles who demand a roof every time it rains, who expect, in the open spaces, metropolitan hotel service; they are not for the "crabs", who cannot stand a sore muscle or two, or the harmless jibing that every "dude" in the West gets, or who are not really interested in the parks except to say later they have been there. They are for men and women who wish to enjoy the pleasures of the camp and trail and of the fellowship they inspire, who are interested in seeing so far as possible the wonders of the parks in their natural, untrammelled beauty, and who are "good sports."

Grand Canyon, Glacier, Yellowstone, and Jasper Park, Canada, are the scenes of the 1930 activities, together with the Inner Passage from Seattle to Prince Rupert. Last year, with three trips solely to the South Circle in Glacier National Park, the Association received unanimous acclaim from the 50 members of the parties. With even more wonderful locale this year, it can

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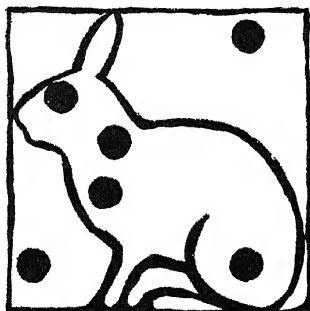
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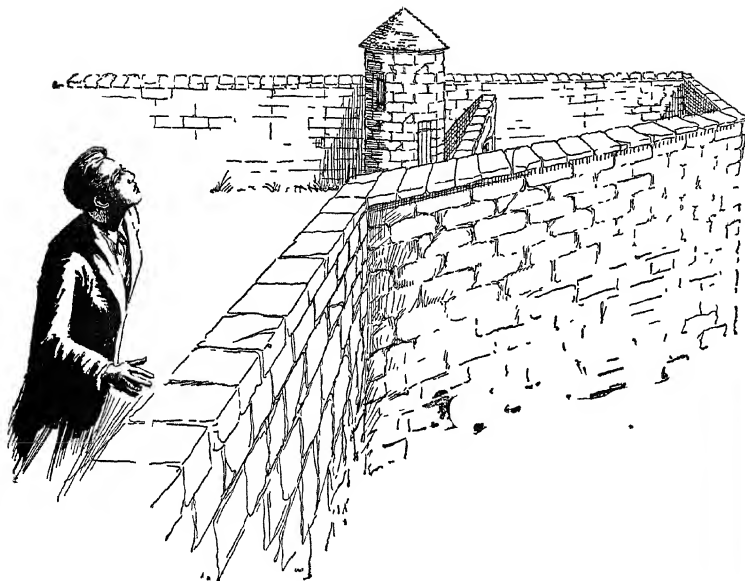
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The break in the stock-market found its reflection in many cancelled reservations, both rail and ship, but despite the untoward behavior of City Service and United States Steel, more people will undoubtedly travel this year than ever before. One night in November, the Twentieth Century Limited pulled out of New York for Chicago without a single drawing room taken, but that was during the height of the scare. The travel-minded are planning for bigger and better trips while the North presents its version of the Ice Age.

* * *

The Pacific Northwest each winter is finding more favor, and offers its rivalry to famous California Snow, there is almost unknown, except in the mountains, golf and other sports can be played all the year around in Portland, Tacoma, Seattle and other cities. Yet the mountains are close at hand for winter sports, and Mt. Rainier Park, open all the year, offers multiple attractions in this line. The Columbia River Highway, the Mt. Hood Loop and other famous trails of the Northwest are nearly as beautiful during the winter months as in the summer, and are much less crowded.

* * *

Death Valley, the hottest place in the United States in summer, is delightful in winter, and California could not be seen without its inclusion. The Union Pacific runs three days' tours to this spectacular desert spot all winter, the cost of which is small for what you get for it. If you are in California, do not fail to get the thrill which comes with the realization that you are standing on a spot actually below sea level.

* * *

Havana, the play-spot of the Western World, has allurements during February that are all the more tempting with each snowstorm. During the latter part of February, the competing boats of the International Star Class Regatta will race in Havana Bay, the Carnival season begins on February 9, and the carnivals with their beauty contests, receptions and parades take place on different Sundays during that month and March. Then there are the horse-races at Oriental Park for those who love the ponies, golf, tennis, swimming, and sight-seeing. The Waid Line is offering an attractive number of all-expense tours to this garden spot, ranging from \$165 up for nine to seventeen days. And the three-day ocean voyage will not be the least of the pleasure afforded by such a trip.

* * *

So many adjectives have been used up describing the wonders of Bermuda that anything on the subject is hackneyed. It is the "Gulf Stream Playground." Everyone should go there at least once, to ride over the coral roads, to canoe in the inlets and sounds of lapis-lazuli, to study the great variety of vegetation. The Royal Mail line is offering beautiful, leisurely voyages to Bermuda ranging in price from \$70, round trip, up to \$800, via the well-equipped "Acadian". The forty-eight hours spent on this boat are altogether too short, especially when they are bringing you back to the North. Its prices and service are just about the same as those of the Furness-Bermuda line, which for a number of years has served Americans pleasure- and comfort-bent.

CHRISTIAN PSYCHOLOGY



Leads Men and Women to the Kingdom of God and adds unto them the Things and Conditions necessary to their Happiness, as Jesus promised. It teaches them to pray for the things they want in such a way as to get them, as Jesus said they should.

For nineteen hundred years the world has sought a better understanding of the teachings of Jesus, which would enable men and women to have the more abundant life and happiness which He promised.

He said to some of His followers (Mark 11 24) "What things soever ye desire, when ye pray, believe that ye receive them, and ye shall have them." It is a promise that *anyone* may get *anything* he wants, by praying for it—that is, by praying for it in a *certain* way.

Again Jesus said to certain followers who were worrying about their physical and financial affairs (Luke 12 31) "But rather seek ye the kingdom of God; and all these things shall be added unto you." There can be no doubt about what this promise means—especially if we read the context beginning at verse 22. It clearly and simply means that if one can find the kingdom of God, his physical and financial problems will solve themselves—that there will be "added" unto him the things necessary to his happiness.

The tragedy of it is that these promises are not generally fulfilled in the lives and affairs of Christian people. Millions have diligently sought the Kingdom of God for years without finding it—without having anything much added to them. They have prayed earnestly for things and conditions they desired, without getting them. Millions of these good people, in the churches and out of them, are cramped and hampered

by poverty, limitations, lack, sickness, worry and disappointment.

But there is nothing wrong with these promises of Jesus. The trouble is that men and women have failed to understand and use them correctly. They have thought the Kingdom of God is a place or condition outside of themselves, whereas Jesus said (Luke 17 21) "The Kingdom of God is within you." They have understood Him to say, in reference to praying for the things they want: "Believe that ye shall receive them," and *that is not what He said*, nor will such belief get what Jesus promised they should.

CHRISTIAN PSYCHOLOGY

now comes forward with a great flood of the white light of simple scientific truth. Under the illumination of this light men and women are finding the Kingdom of God and having added unto them the things necessary to their happiness—they are learning how to pray for the things and conditions they want in such a way as to get them, as Jesus promised they should.

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is Judge Simmons' crowning work—a work in which the Christ-light shines forth as the true light of the world, leading men and women on to higher, nobler, happier and more abundant life. He has set forth its fundamental principles in a marvelous soul-thrilling lecture of 6,000 words entitled "The Kingdom of God," in which he tells just what the Kingdom of God is, where it is, and how to set out to find it and enjoy its rich rewards. A manuscript copy of "The Kingdom of God" will be

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NATURE MAGAZINE

PUBLISHED BY

THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-of-Doors, and
Devoted to the Practical Conservation of the Great Natural Resources of America

THE MAGAZINE

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\$3.00 a Year

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MAGAZINE is published monthly by the American Nature Association.
Second class matter May 31, 1927, at the post office at Washington, D C
Additional entry at Greenwich, Conn

*Subscribing Membership
Blank will be found in the
back pages of the magazine*

Street, N W, Washington, D C

Additional Offices of Publication, Greenwich, Conn

ADVERTISING OFFICES

Washington, D C—1214 16th St

San Francisco—Hunter-Dulin Bldg

Los Angeles—Lincoln Bldg

Seattle—Henry Bldg

Atlanta—Grant Bldg

Title Registered U S Patent Office

The SENTIMENTALIST

An Editorial

ONE frequently sees the Nature lover or "sentimentalist" scored for his lack of grasp of a situation that is often tersely described as "Game versus Vermin", or some other aspect of conservation. Since the opinions expressed often show a lack of appreciation of the standpoint of the non-hunting lover of wild life that is quite as profound as the ignorance that is ascribed to him, his viewpoint may be emphasized.

The "sentimentalist", as he is termed, often in derision, may have as broad a background of experience as his critic. Sometimes he is a sportsman who has seen, with the passing of the years, the gradual depletion of our wild life, and who has laid aside the gun. He may be one who has never hunted, but derives ample enjoyment from observation of wild life, without killing. Sometimes he has other points of view. In any case his attitude should, in fairness, be accorded that degree of respect that accompanies sincerity of purpose not actuated by hope of gain.

Especially during the past thirty years have we seen the wild life of our continent ravaged in the name of sport, and the commercialism that depends on it. In this destructive alliance there has grown up a theory that the rights of the sportsman are paramount, and that he is justified in destroying any species that interferes with one that has been designated as game. This attitude seems to betoken a degree of selfishness, and an assumption of ownership, that will not stand the test. Has he who has never taken up the gun abandoned title to his share of grouse, or quail, or hawk, or owl? Is not his enjoyment as worthy of recognition as that of the man who finds enjoyment in killing? By what process of reasoning is the non-killer asked to relinquish his share? Surely he has a right to claim joint interest in wild creatures, and to assume some responsibility for their protection.

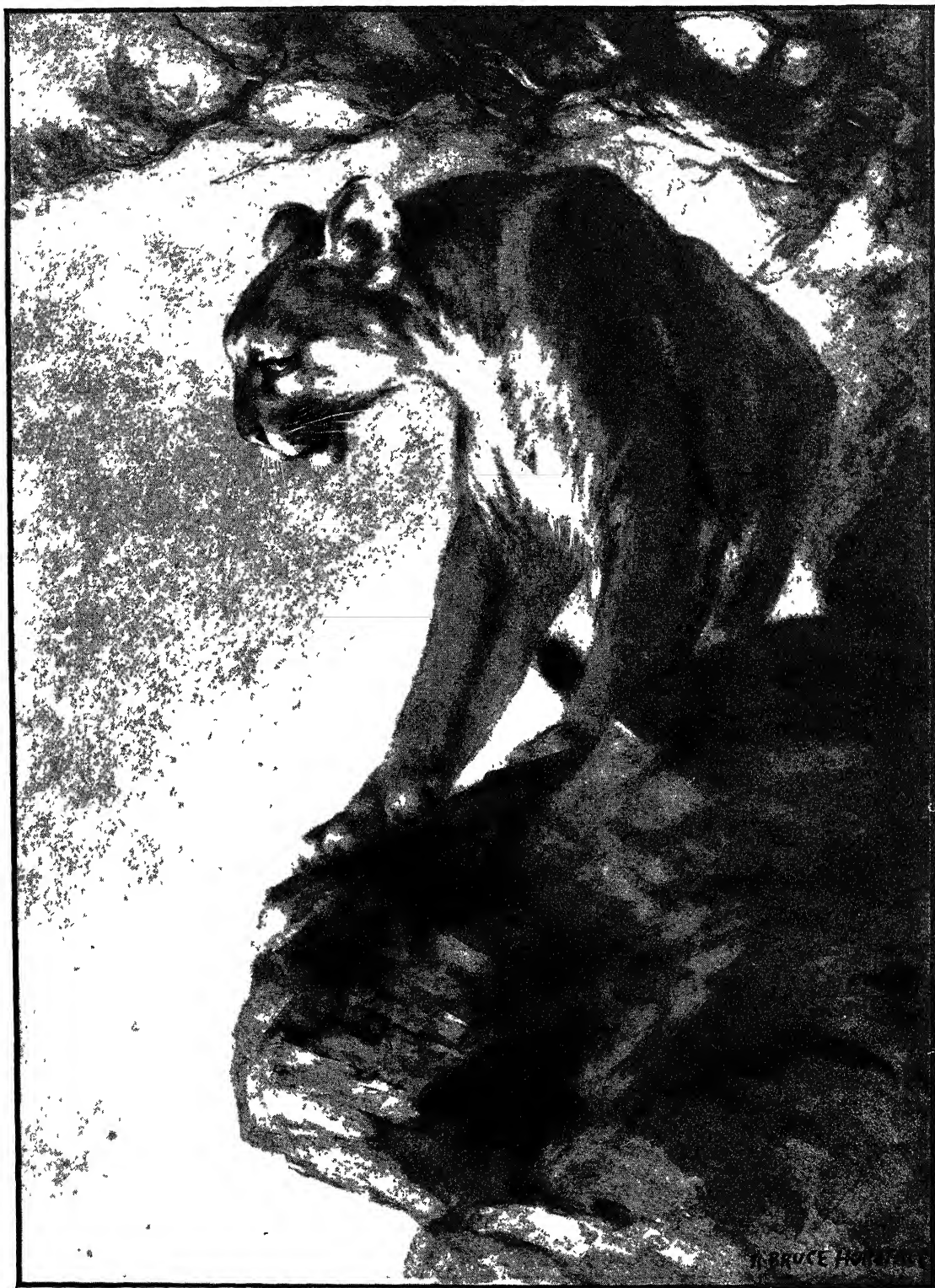
Settlement has seriously interfered with many of our larger species, no one believes that the bison could maintain its millions on our western plains. But settlement, and natural enemies, and diseases, have all been much overworked in accounting for the recent rapid decline in our game species. The disinterested student, reviewing the history of our game during the past few decades—an ever-dwindling supply pursued by a constantly increasing

army of hunters—believes, unless a truer type of conservation is adopted, that the virtual disappearance of those marvelous creations that in his own memory peopled abundantly the woods and fields and marshes of our continent is inevitable. If in his pleas for less killing he may seem to tread on the toes of sport, it is through fear that the few larger species that are yet spared us in fair numbers will follow those that have gone.

An assertion given much emphasis is that the non-killer does little or nothing to preserve our wild creatures. What greater protection can be given the bird than to spare its life? And, as examples, let us remember the gift of Marsh Island, Louisiana, by Mrs. Russell Sage, the Rainey Wild Life Sanctuary, in the same state, financed by Mrs. Grace Rainey Rogers, the earlier successful work of Abbott H. Thayer in behalf of the sea-bird colonies on our Atlantic Coast, and the recent act of Edward Bok in establishing his Florida preserves. What of the thousands of dollars contributed by the Audubon Societies and other disinterested organizations, and expended in sanctuaries, warden service, and winter feeding? Especially let us not forget that greater value, unmeasurable in terms of money, represented by the moral and educational influence of such efforts.

The school of thought that the Nature lover represents and that brings him criticism is largely the direct product of conditions that are continually becoming more evident. His forces are being recruited from the ranks of those whose repugnance to the slaughter that so often masquerades as sport has forced them to action, by landowners and farmers who resent the destruction of property caused by careless hunters, and who are determined to protect the wild creatures they raise, and by sportsmen who have come to realize that the benefits gained by life in the outdoors may be obtained without killing, and who are welcoming the new régime.

The "sentimentalist", contrary to the conception pictured by his critics, is by no means an isolated and visionary backnumber, ignorant of his subject and spending his time deploring and supplicating. He is a student of the present, interpreting it by the lessons of the past, and working for a more abundant future. The fact that he is being recognized as a militant force is significant.



COUGAR, OR MOUNTAIN LION—AN-
OTHER VANISHING AMERICAN

*For their sins, both real and imagined, these
native cats are being gradually wiped out.
Only about five thousand remain*

Volume 15
Number 2

February
1930



WRITE YOUR OWN
CAPTIONS

What is the cougar thinking about here while it regards Bill Finley in the nearby tree holding something that whirrs in a black box?

TRAILING *the* MOUNTAIN LION

And, What's More, Making Him Pose for Pictures

by Arthur Newton Pack

Photographs by William L. Finley and the Author

JUST as I came out under that tree and fired at the lion, he screamed and jumped straight at me. I shot him seven times while he was in the air, and if I hadn't had that Luger automatic he'd sure have broken my neck. Another time . . ." and just then an owl hooted. The listeners shivered, but the old owl was undoubtedly wise enough to know the kind of "lyin' hunting" that is done around the rim of a cosy camp fire.

Eastern tourists constitute a serious temptation to the veracity of a "dude wrangler guide". The only lions that such an audience knows about are the kind which a

ONCE more a *Nature Magazine* photographic expedition gets what it goes after. In this article Mr. Pack tells some of the experiences of the recent trip to get pictures of mountain lion—a vanishing species—in their native habitat.

well-known hunter and wild animal photographer baits with a zebra tied to the rear axle of his automobile in brightest Africa, or the supposedly bloodthirsty beasts which pursue helpless heroines and capering comedians throughout six reels of film (with roars now thrown in free). And yet there really are wild lions in America. There are mountain lions, cougars, pumas, panthers, painters, catamounts, brown tigers, varmints, Indian devils, mountain screamers, king-cats, or whatever the story teller chooses to call them. Some of the lion stories are true, but the live material to make stories about is



rapidly disappearing Where elevated trains shriek and Lions Clubs now meet on the seven-teenth floor, real mountain lions once roved Then all good citizens preached that the only good lion is a dead one Indeed they not only preached but practised so effectively that there are no

longer mountain lions anywhere in the eastern United States Today western ranchmen carry on

Southwest of Safford, Arizona, lies a fine collection of materials left over in the making of the rest of the world, but assembled in a somewhat careless manner These are the Galiuro Mountains Perhaps it is this very irregularity and haphazard quality in the scenery of the wilderness that gives it its wonderful charm, but that also has had its effect upon Arizona mules and some few Arizona citizens We had been commended to a gentleman resident of this country who owned mules and horses He agreed to transport us into the back country of Rattlesnake Canyon to pursue mountain lions in their natural habitat and take motion pictures of both We also had Cleve Miller, an experienced lion hunter on Uncle Sam's payroll and four bloodhounds trained to follow no trail but that of a mountain lion Mere man with all his cleverness can not find a lion when he wants one Everything looked very bright, and nothing had been overlooked except the vagaries of Arizona mules

But all was not as rosy as it looked. There followed days of riding the rim rocks; battling our way through the terrible scrub growth of the steep and treacherous hillsides, following trails that ranged from lukewarm to frigid All to no avail At last one day when our food supplies were running low Miller declared, "There's more lions in my country than there ever was or will be in this God-forsaken range A man can ride after his

WHAT ARE THESE MEN FOOLING FOR?

The lion dogs can't understand these antics, least of all not killing the lion they have tracked



A FILM STUDIO IN THE TREE TOPS

Few feet separated Bill Finley in his tree from the cougar in its—but that's how it is done

dogs without getting into some blind box canyon he can't get out of There's wild turkeys, too—lots of 'em, and good water If I had you folks in there I'd sure show a lion where you could get at him "

And so we left the Galiuros, Miller to ride home and meet us at "the old MJ Bar trap on Stray Horse Creek," and we to make a long, round-about trip to Miller's Utopia of game not far north of Safford Our route took us by horse and automobile around through New Mexico and back into Arizona, over roads almost unbelievable, until we came to the Blue River and at last a low, log building bearing a shabby sign, "Blue P O " There we left the car, found that we could outfit up the canyon a bit, and at last rode west from the Blue River In a few hours we came out at a roughly-fenced corral in some woods by the side of the stream we had been following This stream was the Stray Horse and the corral was the MJ Bar "cattle trap" where Miller was to meet us

In Arizona a man does not say, "I'll meet you at the cigar counter at ten minutes after three " He says, "I'll get to the MJ Bar trap about Monday and meet up with you there," and whoever arrives first waits Twenty-four hours after our arrival Miller rode into camp, leading an extra horse to carry his bed Old Sandy, Blue, Boob and Rosy were with him,—not on any leash, but fastened together in pairs to discourage hunting en route

Next morning as we were eagerly preparing to start again on a lion hunt, two strange horsemen appeared Western hospitality dictated that they be asked to "get down and have a cup of coffee " Hodges and Cosper, who had outfitted us, knew the men by name, for everyone in this country naturally knows all of his neighbors within fifty or a hundred miles They were camped up a side canyon not far away from us and had ridden into the mountains to see how their cattle had fared over the winter and to brand such calves as they could find Hardly had the appropriate explanations been given when the dogs set up a furious barking and yowling, and



three strange hounds appeared, followed by another horseman. It seemed as if this great wilderness had suddenly become heavily populated. I saw Cosper and Hodges exchange a quick glance, and Miller's face assumed a peculiarly tense expression.

"Hello, Ben," said Cosper. "Get down and have some coffee."

As the new stranger strolled over to the fire and squatted on his heels, the name Ben suddenly clicked in my mind. Ben Black, a rival lion hunter, was also working for the government, and Miller had spoken more than once of Black's encroachments on what our hunter considered his exclusive territory. There was no chance of these two enemies working together, and if the old adage about too many cooks spoiling the broth was true, certainly too many lion hunters would spoil our chances of getting mountain lion pictures.

Conversation in our little circle was polite, but strained. "You hunting lions?" inquired Black.

"Yes," replied Miller. "These folks want me to tree a lion for 'em so they can get some moving pictures." Silence.

After a time Hodges threw his cigarette into the fire. "Where are you figuring on hunting, Ben?"

Black caught the idea. No other words were necessary. "I saw a track over at the head of Neckup last night on my way over, and I kind of figured on following it up with the dogs."

Cosper now joined in. "We are hunting on this side of the Stray Horse today, so I guess we're not likely to meet."

"No, I guess not," replied Black. "That lion track I saw was headed the other way."

For several days the agreement held. We rode each morning with Miller up and down

the mountains through a new kind of brush which tore at our hands and faces and whipped our chaps into a worn and weary appearance. Several times the dogs took the trail of a lion without success.

Each day we rode back to camp early in the afternoon, for the sun was then too hot, and what little scent might have been left in the morning would be gone. It was good to get back to our bubbling creek, fed by the snows which still lingered far back at the nine-thousand- and ten-thousand-foot levels. It was good to feel one's legs and arms and find them all there, and to say, "Well, my horse didn't fall today, although when we pitched off that rim rock after the dogs I don't see how he ever kept on his feet." But the "hunting" and lying we did about the camp fire lost its charm, everyone had told all the lies he ever knew. Time was running against us, and we had no lion.

Now came news which, like the fancy or mirage of a cooling spring to the thirsty desert traveler, brought longing and dismay. Hugh Trainor, one of the cow-punchers, rode into camp one evening. "Ben Black got a big lion yesterday," said Hugh. "He was starting for home and I rode along with him for a ways. He struck a trail about half-way to the rim road and killed the lion over on Strawberry Mountain. Too bad you folks weren't there, for the lion was a big fellow and he treed low where he'd have made a good picture."

We sat about the fire and cursed. Cleve Miller was in the dumps. He prided himself on being the best lion hunter in Arizona and, through Ben Black, fate had handed him a blow. He could not even tell more stories of his past prowess. DeWitt Cosper alone seemed hopeful, and long after we sought our own bed rolls under the two fir trees he and Frank Hodges were still talking



TO JUMP OR NOT TO JUMP, WHICH SHALL IT BE?

Above the mountain lion surveys the situation below, while, anxious and expectant, one of the dogs is tense waiting for what may happen next.





(Left) WE COULD NOT RESIST PRINTING THIS PICTURE—GUESS WHO

Correct, it is Bill Finley mounted for a stirring gallop over the country-side on his spirited thoroughbred



(Right) ARMORED FOR THE ROUGH COUNTRY WHERE LIVES THE MOUNTAIN LION

Arthur Newton Pack, president of our Association and leader of the expedition, getting ready for the day's ramble

in low tones about the fire. The next morning we awoke to a dead camp. The men had already gone.

Over our breakfast of beans, biscuits, and beef—the three B's of Arizona—we discussed the situation. We knew that if they did find a lion and tree him, someone would come back to guide us to the spot. We were tired of that strenuous riding, anyhow. Long ago we had been forced to give up the scheme of using a packmule to carry the motion picture outfit. The mule always got caught in the brush and tried to wipe the cameras off against a tree. Bill Finley is a professional wild animal photographer, and both of us used standard size cameras. We had two hand cameras, however, and these we carried fastened to our saddle horns. In spite of our leather chaps, our knees were black and blue from the banging of the boxes against them. The camera cases were nearly cut to pieces. Mrs. Pack carried our tripod on the horn of her saddle, and she, too, had been nearly wiped off her horse several times, when the case caught in the brush and swung against her.

Suddenly, about two-thirty, we heard the clattering of hoofs, and the three men came splashing up the stream.

"Well, I got a lion for you sure thing this time!" yelled the hunter. "The dogs have got him up a tree clear on the top of Red Mountain!" He swung his leg over the saddle horn and began the narrative.

"Our horses are nearly dead. It sure has been one heart-breakin' ride. That north side of Red Mountain is just one series of rim rock, and cliffs, and it is pretty near impossible for a horse to get up. Those dogs hit a lion trail about daylight, but they lost it later. When DeWitt come up, he suggested that he 'cut sign' on ahead a way, farther up the mountain, where the ground wasn't quite so dry. Well, he found another lion track and when I brought the dogs up, they sure recognized it as the track of the same lion. They kept on up the side of

the mountain, lost the trail at another open sunny place, and again we found it for 'em. This time they went clean up to the very top of Red Mountain. My horse fell twice. It was the worst going I ever saw. Then, just over the top of that mountain, those dogs come upon the lion. He must a'been asleep or resting. First thing I knew I seen old Sandy jump the son of a gun out of some brush. He's a big fellow all right, and he was so surprised to find the dogs right on him that he ran only about a hundred yards or so and scrambled up a pine tree. But believe me it sure is some ride from here."

When we looked at their horses, we believed it. Miller and Cosper both thought that we might more easily get up to where the lion was by starting up Stray Horse Creek and going west until we hit a side ridge which ran toward the peak of Red Mountain. We held a council of war as to what to do. If it should take three hours to get up to the lion, very little daylight would remain for pictures, but we had waited three weeks to get a chance for pictures and simply couldn't afford to miss this one. The only alternative was to spend the night under the tree. The mountain was nearly nine thousand feet high, and it would be bitter cold. The country was so rough that no bedding could go with us. Blankets or no blankets, food or no food, up Stray Horse Creek we started.

It was a long, tough ride before we at last stumbled down to the tree, where, forty feet above us on a sturdy

limb, crouched the lion. He was a big fellow, sure enough, about the size and color of a circus lion, but without the mane. The cougar's face, too, was different,—more like that of a cat. The long tail, without noticeable tuft, hung down and twitched slowly from side to side as the creature eyed us and snarled at the barking dogs.

The older dogs, Sandy and Blue, could not understand why their quarry should





**TWO VIEWS OF OUR
FRIEND AND MOVIE
STAR ON LOCATION**

*At the left a survey of the
situation below is under
way and at the right a de-
cision has been reached to
come down and change
trees*



be kept so long in the tree. They leaped upon their master, begged and besought him to kill the lion and be done with it. Old Sandy even refused to drink. He simply sat at the base of the tree and looked up.

About the base of the tree we built a crackling fire, and collected great piles of wood to keep it going. Then Miller and Cospier set out for camp, hoping to get in before dark. In the morning they would return with food and water. Frank Hodges clearly did not like the idea of the strange vigil, but he stayed on. Darkness slowly came. The canyons below us were already dissolving into gloom, and the last rays of light gilded the mountain top above us. A cold breeze stole in from the main range of the White Mountains to the west. We hugged the blaze. As the flames leaped up, our lion climbed a little higher in the tree. He did not seem to be excited about it, but settled himself on a limb. The dogs gradually realized that we were looking after the lion and finally condescended to lie down and doze.

It is all very well to talk about sleeping about a camp fire without blankets, but in the high mountains in April the word sleep is—well, just try it! We sat and shifted positions and tried to keep up our spirits. Even the thought that up there in the darkness forty feet above our heads lay a large mountain lion was secondary to warmth. Once or twice Finley snored, and surely we all dozed, to awake and shiver. Somewhere not far away a great horned owl hooted.

At last, over behind the opposite ridge, the stars began to grow dim. Morning was coming, but in the mountains this is the coldest time of all. We threw more wood on the fire and hugged it closer still. At last sunrise came. Now able to see my way, I climbed a little way up the steep slope from the tree, reveling in the warmth of surplus effort. I turned to look at the tree top. "He's still there!" I shouted. Mrs. Pack came scrambling up to see for herself. The great cat lay sprawled out

on the limb, with one forepaw doubled beneath him and one forefoot and one hind foot hanging down. He raised his head and looked at us in a rather bored manner, as much as to say, "Those darned human beings are still there. Won't they ever go away?" At my shout, however, two of the younger dogs began to bark. The lion turned his head to look at them, and snarled, whereupon the other dogs joined in the chorus.

It was after eight when the other men appeared with water, and we made ourselves hot coffee and ate a little dry bread and jam. We had hardly finished when there was a great shouting, yipping, and barking above us, and down the ridge rode Hugh Trainor, his partner, and the rival hunter, Ben Black, with his dogs. They had heard that Miller had a lion treed, and in true Arizona style had followed the tracks of the horses to the spot.

It was necessary to get the lion to change his position for pictures so a shower of small stones was tried. The lion snarled, and although the missiles could not hurt him at that height, he decided that it was no place for a self-respecting animal and proceeded forthwith to come down. He came down head first, spiraling about the tree for the best foothold. My camera was mounted on a tripod on the steep slope, where I could get a good picture of his actions. Finley was well placed at an opening in the brush. This combination worked excellently, for the lion came out on the bare trunk, about twenty-five feet from the ground. Suddenly, and with-

out any warning, he leaped clear in one magnificent jump. His long body, with tail straight out, described an arc right in front of Finley's camera, and he hit the ground close to one of the dogs, a good thirty or forty feet away from the base of the tree.

At the first movement of the lion the dogs had set up a howling and barking, and as the tawny body launched itself through space we all began to shout with



excitement The lion landed with a thud, but safely and cat-like on all four feet Before the dogs could recover from surprise he was off through the thick oak brush. I tried to follow his progress with my camera, but the brush was too thick Swinging the lens around in advance of the lion's probable path, I sighted the great cat making up another tree. I pushed the lever Not one of the dogs reached him, and he scrambled up cat-like, but with a

spiral motion about the trunk, until he was once more among the limbs and could climb with their aid Up to the very top of the tree We all hurried with our cameras, as rapidly as we could over the rough ground All seven dogs were barking furiously and jumping about the trunk of this tree, another pine about fifty feet high.

About twenty feet away was virtually a twin tree Marvelous luck! Bill Finley called to one of the cowboys to throw his rope over a limb. With this aid he began to climb, reached the first good limb and hauled up the camera

Our guides and the cowboys looked aghast. They could not climb, and, truth to tell, they were more or less afraid of the lion Finley worked his way up, hauling the camera after him As Bill climbed so did the lion At last both the great cat and Finley were seated opposite each other on the last strong branches There were nineteen feet between them Finley pointed his camera at the lion The lion laid back his ears and snarled

Bill was in his element and perfectly happy. "What shall I do if he jumps on me?" He called down

"Throw the camera at him."

"Do some heavy jumping yourself"

"Change places with him"

The lion kept on snarling The camera began to buzz I worked around the



A ROUGH COUNTRY—THIS COUGAR LAND

The members of the expedition hit the trail with the guides on the movie mountain lion hunt

he could toward Bill Below we held our breaths I had at last found a fairly good set-up and stood poised with my hand on the release lever, determined, that, inasmuch as I could not help Finley, I was going to get a splendid picture of his rapid demise But the lion had not much bluff in him, and no fight at all Such is the way with our American mountain lion He can do a lot of damage if he wants to, but he makes it his business to avoid a fight unless absolutely necessary The lion lay down again and licked his chops

Finley climbed to the very top of the tree and leaned out as far as possible He pointed his camera and pushed the lever Nothing happened The film was jammed. Climbing part way down he called for a changing bag, and, balanced in a fork of the tree, both hands in the light-proof bag, fixed the jam

The men were getting restless It was noon, and we were hungry and thirsty Finley called down that he

wanted to get the lion yawning No luck, and finally he came down to suggest we get the lion to move again With both cameras set up at points of vantage, we again hurled rocks at the lion He merely snarled, but apparently he had made up his mind that there was no use in coming down. Miller said that it was unusual for a lion to jump out of a tree more than once or twice

Now, we knew that that lion had



IN CAMP AFTER A THREE-COURSE MEAL

Beans, bacon and bread below the belt, then comes the business of washing the dishes

caught a deer, to which he was certainly entitled. We had no evidence that he had killed any calves recently, and besides, he had performed splendidly for the movies. Mrs. Pack suggested that we return to camp with the dogs and allow the lion to escape. Finley and I were strongly of the same mind. Cleve Miller, however, had been loaned to us by the U. S. Department of Agriculture as their crack lion hunter, and the idea of deliberately permitting a lion to escape appealed to him as so unique that he was willing to do so. He only asked that we pay him the money he could not then honestly claim from Uncle Sam. But there were two cowboys present who owned cattle in that part of the country, and a rival lion hunter whose record would be improved by this lion. Even if we departed, it was more than likely that Ben Black would stay around, kill that lion sooner or later, and win the credit for it. Miller was distinctly worried, and there was a tension in the atmosphere. I looked at Finley and he nodded. "All right, shoot him," I said. It was an easy shot for Miller.

By the time we had gathered and packed our cameras Miller had the lion about skinned. "Hey!" he shouted. "Don't you want to take some of this mountain lion meat back to camp? It's good eating." I had heard before that mountain lion meat tasted like lean pork, but had never tried it. So I gathered up the steak Miller had cut off before feeding the dogs. With it in one hand and my camera in the other, I started up the mountain.

I was sorry our lion was dead, for he made upon the motion picture film a record which may before long become part of the history of a species practically extinct. I could not deny that this largest American cat is destructive. That he feeds equally upon deer and cattle, where cattle are available, is well known. He will destroy horses, burros, and even goats. Ernest Seton estimates that there may be as many as 5,000 cougars all together remaining in the United States. If each cougar kills \$1,000 worth of other animals each year (counting deer which are protected for the benefit of the sportsman and often at the expense of the farmer whose crops the deer may eat) then the annual bill of damage chargeable against the cougar's account is \$5,000,000. However, I recalled that it has been reliably estimated that domestic cats in New York State alone destroy 3,500,000 birds annually. The same United States Biological Survey

which hires men to exterminate mountain lions estimates the value to the farmer of insect and weed-seed eating birds at \$1.00 each per year. Apparently, therefore, taking the entire country instead of just New York State, domestic cats are responsible for a loss many times greater than that attributed to the cougars. A few cranks might like to exterminate domestic cats also.

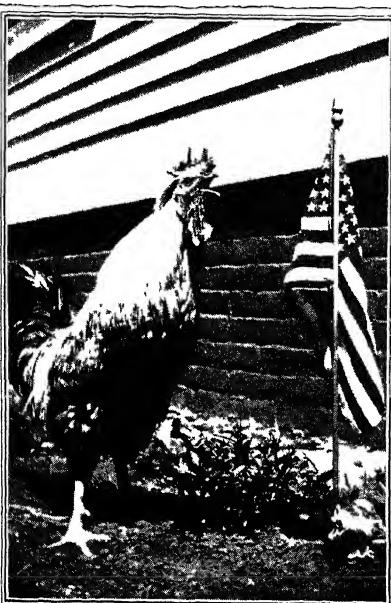
The cougar, because of his taste for deer, is relentlessly pursued by hired professionals, even in most of our western National Parks where game is supposed to roam unmolested. In the Kaibab Forest of northern Arizona the nation has had one example of what over-protection of deer may bring about. When deer multiply without check, the question of food supply becomes serious for them. They gnaw the bark of trees and eat young seedlings, with consequent damage to the forest. Even then many slowly starve to death. Is it not better to permit the natural enemies of deer to take their toll and keep the herds within bounds?

If one grants that deer should be protected so that sportsmen can have the pleasure of shooting them, then why not apply the same rule to the mountain lion? A few of the big-game hunters who go to Africa after lions there might be encouraged to concentrate a little effort on the American lion. President Roosevelt hunted American mountain lions as well as African lions, and wrote most interestingly concerning his adventures, but since that time comparatively few sportsmen have tried it. The shooting of a cougar in a tree is, of course, ridiculously easy and anything but a sporting proposition. The difficulty and danger (for of such stuff is real sportsmanship supposed to be made) lies in the pursuit, the rough riding, and in the wildness and beauty of those mountain fastnesses where a few of these creatures dwell.

The United States Government does not consider mountain lions as game, but merely as creatures so contemptible that professional hunters are hired at five dollars a day and sent out to do away with them. The government uses tax money for this purpose; but the government, through the same Department of Agriculture, does not actually send men to kill the beetles on my fruit trees. It only tells me how I may kill them. As I climbed the mountain with that piece of lion meat in my hand, I wondered whether the American people are giving a square deal to their only native lion.

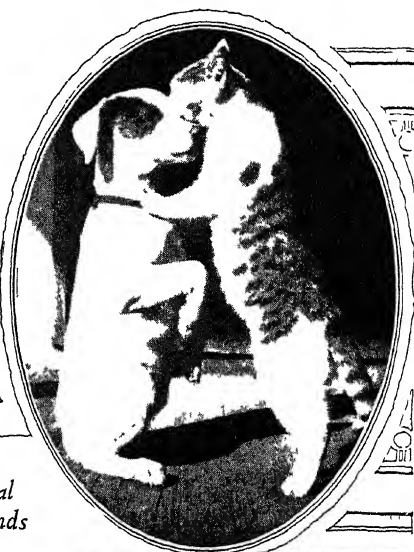
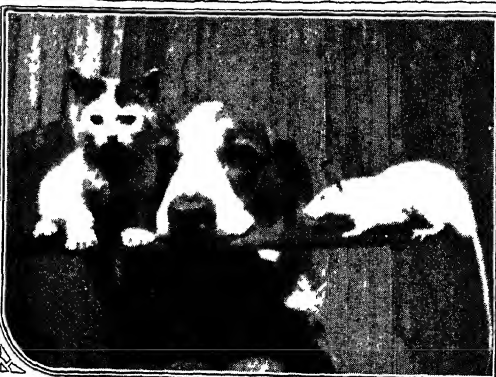
The National Flower Poll

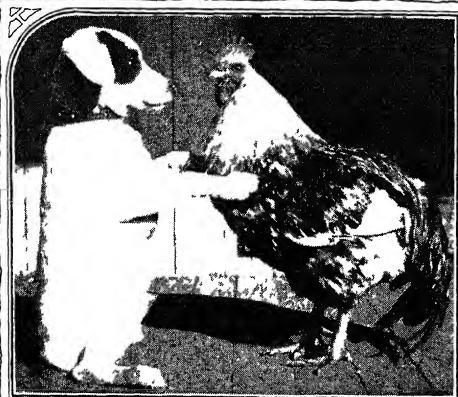
With a total of more than a million votes cast in NATURE MAGAZINE'S National Flower Poll, the tabulators were confronted with a last-minute deluge of votes at the time of going to press with this issue. It was, therefore, impossible to make a complete and adequate final report on the Poll. This will be done in the March issue, when a tabulation of the vote for the entire country and by individual States will be made, as well as a report on the progress and general aspects of this vote, which has stimulated so much flower interest East, West, North and South.

*Fear Not, Little Brother**Flats and Sharps**Patriotism*

SOME MORE BARNYARD PETS

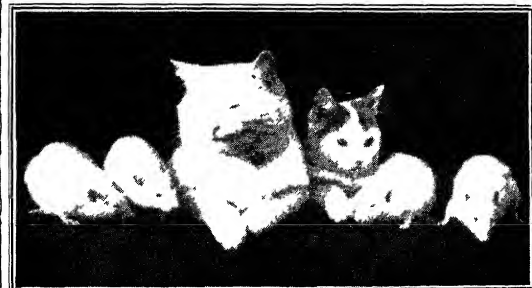
So much comment was aroused by the presentation in these pages some time ago of two pages of pictures of the clever barnyard pets tamed and trained by the affection and persistence of Mrs. Joseph Watson of Connecticut, that when we were able to obtain more pictures of this group we quickly did so. The *dramatis personae* of this most remarkable and diversified family includes Buck, the collie,

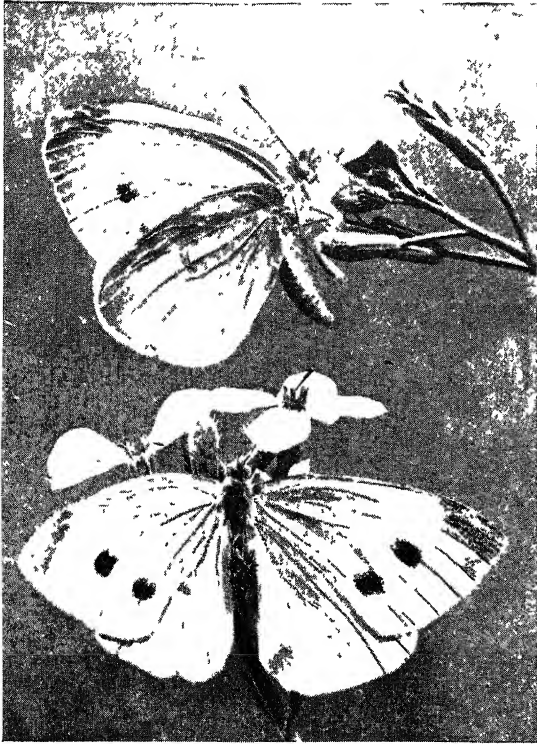
*Real Friends**A Balancing Act**At Mess Call*

*Taking His Measure**Guarding the Bread Line*

and Laddie, his diminutive fellow canine; Tim, the kitten, and Ignatz, the white rat; Grayfriar, the vociferous rooster and Polly, the parrot, of course. One of the charms of Mrs. Watson's pictures of her strange and clever tribe is that they are taken with no attempt at background or setting and with few "stage effects". And most of all they

make one wonder how any living person would have the patience to train them all. Mrs. Watson's barnyard menagerie has also appeared in the movies. Perhaps you have seen them on the screen.

*Hold Fast!**School Days**Friends, One and All**Try This One!!*



THIS IS *PIERIS RAPAE*

Distinguishable by the black tips and the two black spots on the forewings, and the single black spots on the rear appendages

THE equipment is ready,—now for the hunt No need for foreign conquests, however,—the vegetable garden can be the field Here, with little trouble, most of the economically destructive insects, and a number of beneficial ones, can be discovered

At this time of year one is likely to find a number of insect eggs in the cabbage patch, principally the eggs of the common cabbage butterfly These are laid singly on the underside of leaves of such plants as the cabbage, cauliflower, nasturtium, turnip and radish The eggs are onion-shaped, yellowish in color, and deeply ridged

To prepare specimens for the breeding cages, cut off the leaf surrounding the eggs, and place them on a small portion of it in one of the pill boxes A specimen label will read "No 1—egg on wild mustard Location: vegetable garden Date: March 15, 1930" Probably a dozen similar eggs can be obtained to make excellent material for breeding and observing the life history of the worm. Photographs may be



A RUINED CABBAGE

It is not much good for anything after our friends the cabbage worms get through with it

THE CABBAGE BUTTERFLY

We Pursue Our Insect Hobby

One Step Further

by C. F. Greeves-Carpenter

Photographs by Cornelia Clarke

This is the second article in the series on "Breeding Insects as a Hobby", the first having appeared in the January issue

attempted but these may or may not be very successful, according to the photographer's skill

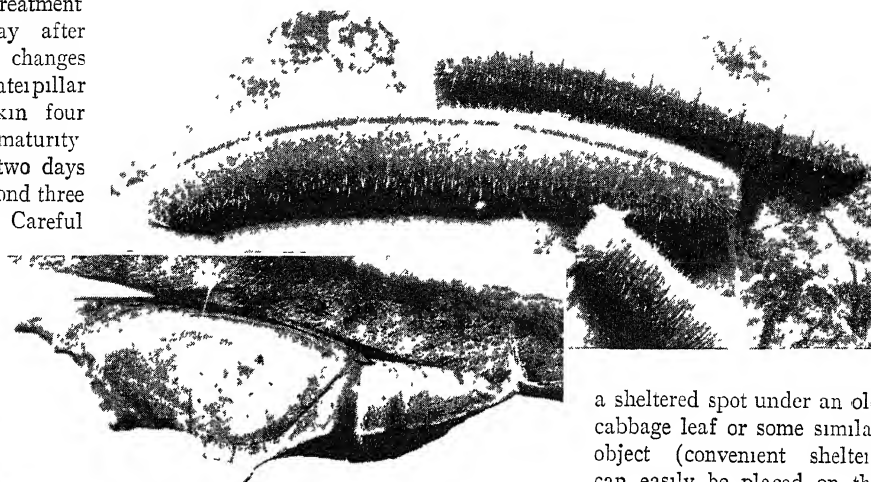
The collection of eggs will go in one of the breeding cages, and be kept in a warm place where the temperature is between 70° and 80° The same conditions as are present in the garden should be maintained as far as possible If the eggs were freshly laid it may be a week before they hatch, during which time it is inadvisable to handle them. Copious notes should be taken, to place under specimen No 1 "three days later, noted the egg turning a darker color, the next day caterpillar had emerged Larva light velvety green with numerous black specks Half inch long"

The captives must now be fed and therefore some of the leaves of the plants from which the eggs were taken must be obtained, for invariably adult insects lay on plants on which the young will feed Later leaves of various plants could be tried and notes taken on what the larvae will or will not eat The food supply should be changed every day The caterpillars must be lifted gently off the old leaves by hand, and care taken not to

injure them by rough treatment

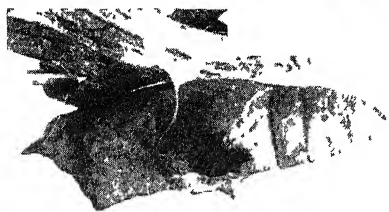
From the first day after hatching interesting changes take place, for the caterpillar molts or sheds its skin four times before reaching maturity. The first molt occurs two days after emergence, the second three days later, and so on. Careful notes must mark these instars, as the periods between each molt are called

If the breeding cage is large enough to contain a growing



ABOVE, THE CATERPILLAR

In the center is the chrysalis, attached to the leaf, a parasitized chrysalis is pictured at the left. The last two are normally found attached hanging vertically from the leaf



a sheltered spot under an old cabbage leaf or some similar object (convenient shelters can easily be placed on the mould of the cage) and then enters the next stage of its existence which is known as the chrysalis.

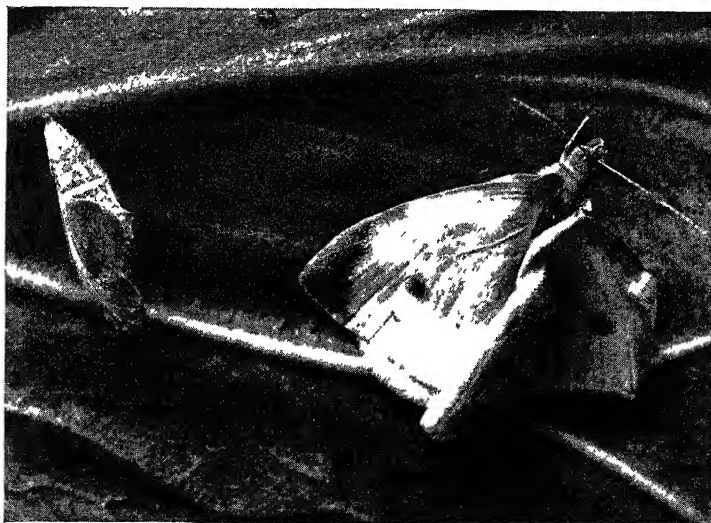
First the insect attaches itself to its shelter with a silk girdle. Slowly it changes color to become, usually, quite similar in hue to the object

cabbage, the feeding habits of the caterpillar can be readily observed. It feeds on the outer leaves of the plant, making them very unsymmetrical and full of holes, and works toward the heart of the cabbage, leaving behind it a mass of dark green excrement.

When the worm is full grown it measures about one and a quarter inches, is yellowish-green with a faint yellow stripe down the middle of the back (technically known as the dorsum), and has a row of spots along each side. It differs from another similar insect that attacks cabbages,—the cabbage looper, in that it has five pairs of prolegs or false legs, and three pairs of real legs, making eight pairs in all, while the other possesses but seven.

At this stage of its existence, the caterpillar will seek

to which it is fixed. It shrinks to approximately three-quarters inch or one-half inch less than it was in its previous form. The chrysalis stage lasts from one to two weeks during the summer time (during winter in the northern States the insects remain in this stage until the following spring), so after the sixth day the specimen must be watched very carefully. The wings, the head and the appendage form in the chrysalis, and then one day the home is rent asunder and the butterfly slowly emerges. It will cling tightly to a support for a little while, and during this time it is but a damp, draggly mass instead of the beautiful, creamy-white butterfly one would expect. This condition is only temporary, however, for after a little the wings become firm and hard on exposure to the air. With a preliminary flap or so, per-



JUST AFTER EMERGENCE

Like a wrecked airplane is the bedraggled butterfly

READY TO FLY

But a few minutes are needed for drying, then away

haps to give it confidence, the butterfly flies off in search of food. It has a long proboscis, or mouthparts extended to form a tube, through which it sucks the nectar of certain flowers. In two or three days after emergence, the female butterfly commences to lay eggs.

These common white butterflies belong to the family Pieridae, seen at any museum, so the species grown can be identified easily. The variety captured perhaps will prove to be a *Pieris rapae*; if so, the tips of the forewings will be tipped with black, with two black spots in the center of each of these wings, and but one spot on each hind wing.

Under field conditions numerous chrysalides of the cabbage butterfly may be discovered. If some of these are placed in the breeding cages, they are liable to give queer results. Instead of the expected butterflies, numerous small flies will probably emerge. This means

that while in the caterpillar stage the insect was attacked by one of its natural enemies. The "attack" took the form of the female enemy laying her eggs inside the body of the host by means of a sharp pointed ovipositor. These eggs hatched into maggots which fed on the tissues of the caterpillar and killed it. This process is one of parasitization, by means of which the natural enemies of injurious insects keep them in check and prevent their reaching overwhelming numbers. When man assists in this control work, by rearing beneficial insects to act against the injurious ones, the work is called "biological control." This method has been tried against a number of different injurious insects with excellent results, and where weather and other conditions have been favorable, good results have been obtained. The battle with the Mediterranean fruit fly in Florida is being shaped along these lines in one of its phases.



A MODEL HOME

Birds Dwell in Style in this Avian Mansion

by Caroline Stafford

(Left) THE KEEPER OF THE BIRD HOUSE
She cares for the tenants of the perfect apartment

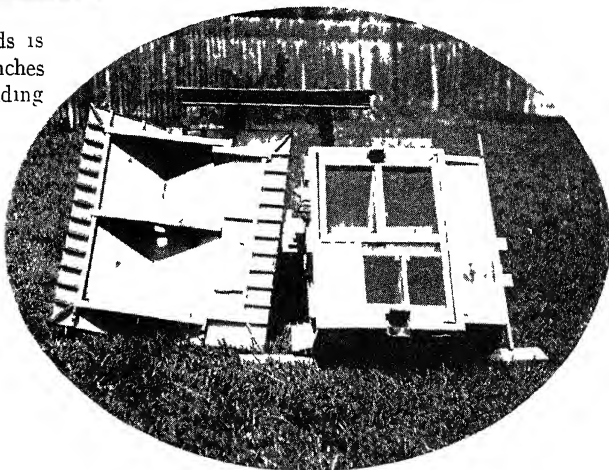
THIS miniature bungalow built for the birds is complete in every detail. It is twenty-two inches long and nineteen and one-half wide, including the porches. The front porch runs nearly the entire length of the building, while the rear porch is but nine inches by three and three-quarter inches. The walls are seven inches in height inside, giving room for the largest denizen.

This is a four-room house, entrance is gained through two openings on the front porch, and two on the rear porch. No matter how late at night it is, a bird can find a way to its own bedroom.

There are two dormers in the roof, consisting of three windows each, thus making a total of twenty-two in the entire house. Think of all the ultra-violet rays that can get in!

The front porch is carved to represent brick; the fireplace, rough stone; and the foundation, concrete.

Ventilation is well provided for through the fireplace and the rear chimneys, and through the screen-covered nesting places. Access to the interior for cleaning is



IT CAN COME APART FOR CLEANING
A view of the comfortable interior. Anybody want to rent?

easily made by removing two screws. How delightful for the housewife! The house is painted a cream, trimmed in a light brown, the brick a buff.

SKIPPER, the MURRE

Who Lived Long Enough to Prove
More than a Bird

by Ben Hur Lampman

Illustrated by R. Bruce Horsfall

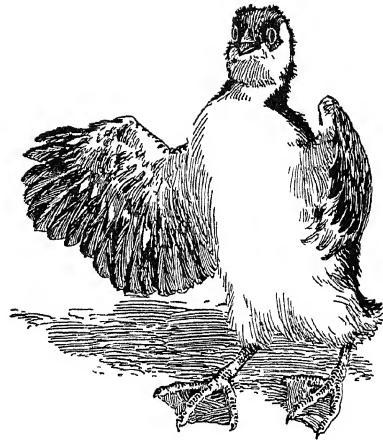
SOMETIMES I fall to thinking of my small friend Skipper, and of what his friendship meant to me. He was as fine a sailor, I dare say, as ever faced the spume and anger of a nor'wester, carelessly shaking the brine from his oilskins. And he was gay of heart, too, as a sailor always should bear himself. His eye was darkly merry and his walk was droll. Few men there are, or have been, to love the great, mysterious ocean as Skipper loved it. Sir, when he looked toward it, the very breast of him swelled with a noble passion and yearning, and an inarticulate cry, as of gladness and sorrow comingled, welled from his throat. Yes, sometimes I fall to thinking of him, for if he loved the sea greatly, he loved me also in some degree. But now he is gone where sailors go when all their voyagings are over.

Skipper was a bird, silvered of throat and underparts, and raven dark of pate and wing and upper plumage. He was a minor, juvenile bird of the species called murre, sometimes styled the foolish guillemot—which signifies the foolish William—and he came ashore



"HE CAME ASHORE ON THE WHITE CREST OF A BREAKER"

on the white crest of a breaker, to be drenched and pummeled on the smooth, cold sand. There we found him, trembling with chillness, his feathers draggled and gummed with the viscid oil that ships discharge at sea, to the grievous misfortune and undoing of seafowl. Death in a score of guises was near to him then, and the most cheerful of all deaths would have been merely to die. This is what men contrive, carelessly enough when they smear the brave surface of ocean with fuel oil from their commerce. A more pitiable mariner never came to land on an inhospitable coast than this same Skipper, whose mother mourned him somewhere far offshore.



"HIS EYE WAS DARKLY MERRY AND
HIS WALK WAS DROLL"

We picked him up from the beach and bore him away to the cottage, and a most dreadful fear was in his heart, for he felt that death had him. When the oil had been cleansed from his plumage, and it was lard that effected this renovation, he ran ceaselessly to and fro beside the seaward wall, crying out to the sea. Not to landward, you must know, but always to seaward. A timeless sadness and longing were in the call, and it was wild as waves, and thin and shrill as the wind in the rigging, and ancient as the sea's self. "Whee! Whee!" In this manner the fledgling seabird cried out to the sea. So we took him back to the sea, and he ran awkwardly toward the creaming verge of it, but upright as a man, for thus it is that the diving birds must run.

"Go back to her, Skipper! Back to her!"

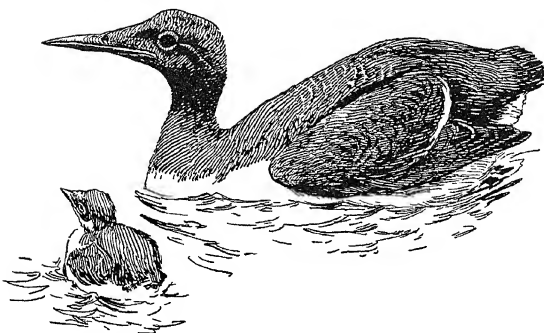
Whether we meant the sea or his mother none might tell. There was gladness in his call as he plunged eagerly into the first wave. He was glimpsed in its emerald heart, swimming bravely with foot and wing. He emerged to cruise across the trough that lies between, and he thrust himself gallantly into the curve of a second wave. And so, seaward, meeting the increasing strength of the breakers, and now and again lifting himself to flutter the half-fledged wings and cry his happiness to the ocean. If he could but win past the white water he would be free of the hateful land, and perhaps he would find her out yonder waiting for him, where the blue bends down. No seaman in peril of life ever struggled more gallantly to reach the kelp-strewn shingle than this young murre to reach the open sea. But weakness mastered him at length, and the breakers tossed him cruelly. Still struggling seaward he was borne back to land in a long arc. We ran into the shallows to his rescue. Poor little Skipper.

Thereafter he learned to love us, and to know his name—to come to that name as readily, I dare say, as when his mother called in those far days that were vague to him. His progression was a stumbling haste, his thin, sharp wings flailing the air. There was something touchingly, heart-breakingly ludicrous in his coming.

"Skipper!" we would call to him. And "Whee!" "Wheeee!" he would answer. The cry that had been all

sadness was now joyful to hear, yet still it was the mood of the sea, and there was a savor in it that must surely have betrayed that voice, though it had been heard in the desert Bouncing, stumbling, running toward one's feet, and clambering with cold little webs into one's open hands—to cuddle there and to contrive minor, sleepy throatings Ah, Skipper, you were in all truth one of the foolish guillemots.

He dined on fish and would have none save such as were of the sea Even trout he rejected, shaking his head with great distaste He dined unwisely when the fare was to his liking—cod, flounder or the green-fleshed kelp fish—but Nature assailed him of the sin of gluttony by the simplest expedients His flight feathers grew apace, and it was his habit to spend many minutes of the day, at intervals, in the practice of those muscles which animate the wings Always he began those calisthenics with the gay shout of "Whee! Wheeee!", and I relate but the truth when I say that neighbors came from blocks around to witness, and that they were rendered quite helpless by most healthful laughter When Skipper thought he was flying, his



"... WHOSE MOTHER MOURNED HIM SOMEWHERE FAR OFFSHORE"

it is so that I see him And at times he seems to be under my hand, snuggling close

Too young to restore to the sea, and with a third affection taught him—well, what would you? At the end of a fortnight we left Skipper in the care of a friend, who promised that in due season the murre should be given back to the ocean And whether our Skipper died of a change of diet, or of grief, I shall never know For die he did, and speedily On the fourth

day of separation with admirable calmness he took leave of the world He had lost three mothers—the murre that hatched him, the sea herself, and us But he had lived long enough—had he not?—to prove that he was something more than a bird.



A CROW TRAGEDY

Evicted Bird Bemoans Fate

by E. I. Mason

DOWN in Santo Domingo there is an olive colored bird known as the palmist or palm chatterer, because of its habit of living in the royal palm trees native to that region, and because its huge nests are as familiar a part of such trees as the bark or the fruit itself Its scientific name is *Dulus dominicus*.

But on the island of Furcy, where the species is also found, the Haitians have cut down most of the palm trees, so these birds are reduced to building in mere pines But they retain their fondness for nests of the apartment house type, and the story is told of the crow who left his nest for forage and returned to find that the robber *Dulus* birds



had started construction on nests of their own, using his home as a sort of cellar

All day long, he spent hours of his time on a limb close to the robbers, crying for vengeance and bemoaning his fate, and for days and days, the scientists who were camping nearby watched him as he picketed the squatters, wolfing about his luck

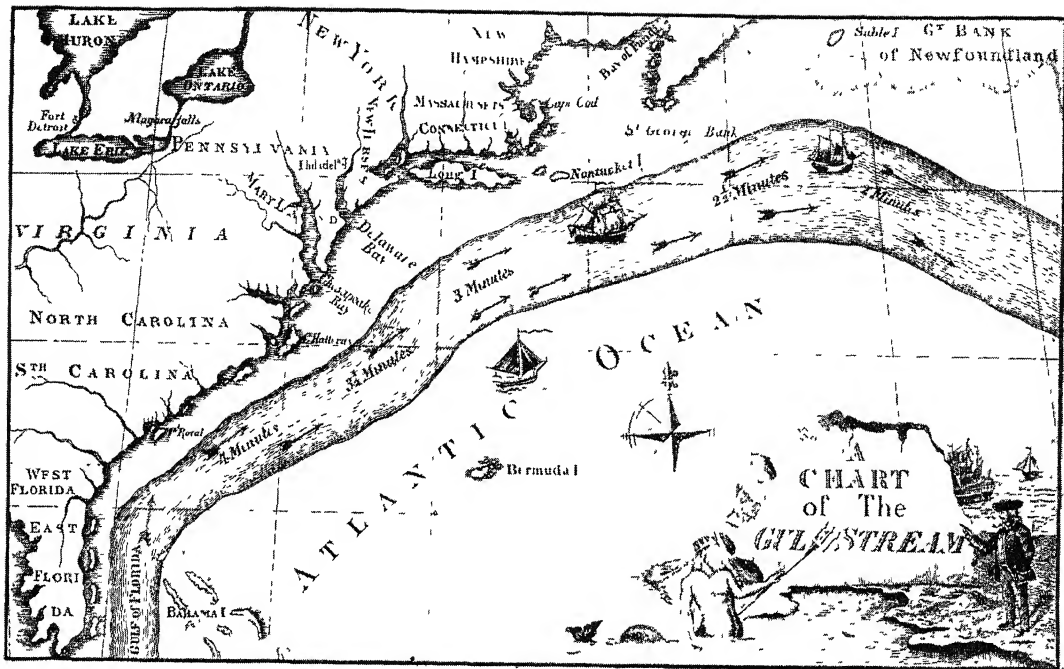
We are told that birds in their little nests agree, but in Nature it sometimes happens that they covet each others' nests, and there is no agreement Our own fish-hawk sometimes permits the grackles to nest in the crannies of the mass of sticks he calls home, but if they tried to use it as a foundation for an apartment, he would probably object

A RARE OBJECT

Natives have hacked down such beautiful trees as these

THE IDEAL SITE

The crows preferred the royal palms to mere pines, for their nest



AS BENJAMIN FRANKLIN SAW THE GULF STREAM
His chart, published in 1770, representing his theories with respect
to this ocean current

The OCEAN RIVER at OUR DOORS

Florida's Famous Neighbor, The Gulf Stream

by Charles Fitzhugh Talman

There is a river in the ocean. In the severest droughts it never fails, and in the mightiest floods it never overflows. Its banks and its bottom are of cold water, while its current is of warm. The Gulf of Mexico is its fountain, and its mouth is in the Arctic Seas. It is the Gulf Stream. There is in the world no other such majestic flow of waters.—M. F. Maury, "The Physical Geography of the Sea."

IN FLORIDA alone, of all the states in the Union, you may enjoy the experience of standing upon the shore and beholding within easy range of vision the deep blue waters of the Gulf Stream. The sight thrills the well-informed traveler because of the many associations that attach to this most famous of ocean currents.

Benjamin Franklin gave the stream its name. Lieutenant Maury made the name a household word by the description that opens his



Yours truly

M. F. Maury

U. S. N.

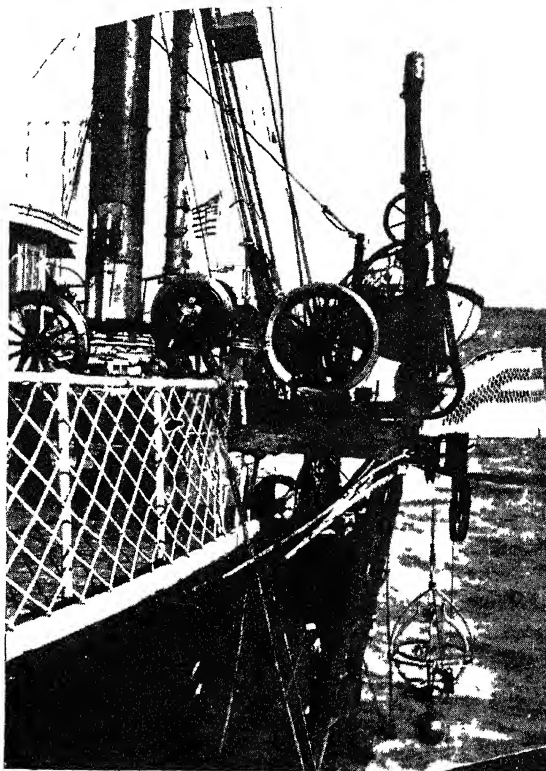
THE MAN WHO MADE THE GULF STREAM FAMOUS
Maury's description of the Stream is one of the "purple passages" of scientific literature

"Physical Geography of the Sea." Long before it was named the Stream furnished one of the main highways by which colonists reached the New World, and at a still earlier period, by drifting strange woods and fruits to European shores, it aroused curiosity and stimulated voyages of discovery. But it is chiefly interesting today for other reasons. In watching it roll by the southern coast of Florida you are witnessing an operation of Nature whereby heat is transferred in enormous quantity from the tropics to the temperate zone. This heat is potential weather.

Ever since science first turned its attention to the Gulf Stream it has been a theme of incessant controversy. Even the application of its name is still an unsettled question. According to most authorities the stream begins

at the Straits of Florida, but the United States Hydrographic Office publishes charts in which the current that encircles the shores of the Gulf of Mexico figures as part of the Gulf Stream. Again most oceanographers are quite insistent that the Gulf Stream ends and a new member of the North Atlantic circulation begins where the Stream broadens south of the Grand Bank of Newfoundland to form what is sometimes called the "Delta of the Gulf Stream." The waters that flow thence eastward toward the shores of Europe have been variously named the "Gulf Stream Drift," the "Atlantic Stream," and the "European Stream," yet the very writers who emphasize this distinction sometimes revert to older usage and speak of the Gulf Stream as extending to the eastern side of the Atlantic and far up into those "Arctic seas" where Maury located its mouth.

The reason why there is a difference of opinion about the beginning and



COURTESY U. S. COAST & GEODETIC SURVEY

MEASURING THE SPEED OF THE GULF STREAM

Lowering the Pillsbury current meter from the survey ship "Blake." After reaching the required depth the meter is set in operation by dropping a heavy weight or "messenger," which travels down the supporting line. It is stopped in the same manner. Both speed and direction of current are measured.

THE GULF STREAM

A painting by Winslow Homer which hangs in the Metropolitan Museum of Art in New York.

end of the Gulf Stream is evident from ocean charts. These show the Stream as merely part of a great eddy that makes the complete circuit of the ocean, surrounding a central area of relatively still water—the Sargasso Sea. We are reminded of the circle of Grand Boulevards surrounding the center of Paris—a single street, which changes its name from point to point—but the analogy is not exact, because there are real differences in the characteristics of this circular current in different parts of its course that justify a diversity of nomenclature.

One of the controversies that formerly raged over the Gulf Stream related to the cause of its motion. Many curious ideas once prevailed on this point. A favorite notion of a century ago was that the Stream was fed by the discharge of the Mississippi and other rivers into the Gulf of Mexico, but—other considerations apart—it is now known that the amount of water supplied





FROM FLORIDA'S SHORES ONE MAY SEE THE WATERS
OF THE GULF STREAM

From these dunes at Daytona Beach and from many another Florida beach one may look upon this stream which so influences the climate of the State

COURTESY DAYTONA CHAMBER OF COMMERCE

by these rivers is utterly inadequate to explain the volume of the current Benjamin Franklin, who anticipated so many other modern ideas, hit the nail on the head when he suggested in 1785 that "this Stream is probably generated by the great accumulation of water on the eastern coast of America between the tropics by the trade winds, which constantly blow there" Franklin's hypothesis was long ignored, and was strongly opposed by Maury, but is now recognized to be substantially correct

Referring again to our chart, we see that the equatorial regions of the Atlantic are occupied mainly by the North and South Equatorial Currents, which set to the westward These currents are produced, respectively, by the northeast and southeast trade winds, which, though subject to some fluctuations, are more nearly steady and constant than any other winds blowing over the oceans. The Equatorial Currents form one huge stream of water as they approach the western side of the ocean, and here their course is controlled partly by the shape of the coast and partly by the earth's rotation, which tends to give any horizontally moving body a right-hand turn in the northern hemisphere and a left-hand turn in the southern

Of the waters that impinge upon American shores, one branch is deflected southward along the coast of Brazil, another (the Antilles Current) is turned to the north of the West Indies and joins the Gulf Stream near the Bahamas, while much the greater part flows through the passages between the Windward Islands into the Caribbean Sea, and then through the Yucatan Channel into the Gulf of Mexico Here some of the water takes a direct route to the Straits of Florida, and

some a circuitous route along the shores of the Gulf to the same point of exit.

The Gulf Stream proper, as it issues from the Straits of Florida into the Atlantic, is the swiftest and most sharply defined of all great marine currents. Its rapid flow is due to a banking-up of the waters in the Caribbean and the Gulf of Mexico The passages by which the water from the Atlantic enters the Caribbean are broader than the Yucatan Channel leading into the Gulf, and this channel, in turn, is much broader than the Straits of Florida, so that there is a funnel-like action that raises the level of the confined waters above the level of the open Atlantic The extreme difference of level between the Gulf and the Atlantic is not so great as it was once thought to be—recent observations indicate that it is barely eight-tenths of a foot—but the momentum imparted by this "head" of water to the Stream suffices to carry it with river-like flow a distance of about 1,800 miles up the American coast and out into the Atlantic.

Through the narrow exit from the Gulf an average of 80,000,000,000 tons of water pours every hour, according to an oft-quoted estimate of Admiral Pillsbury The speed of the current at the surface sometimes exceeds, in places, five miles an hour, but is quite variable, being affected by winds, tides and the distribution of barometric pressure, also, we may presume, by variations in the strength of the trade winds and the Equatorial Currents propelled by them. The water thus discharged into the Atlantic is much warmer and saltier than that of the ocean adjacent to it, and along a great part of its course it may be recognized by its deep indigo color, contrasting with the prevailing green of the Atlantic

South of the Grand Bank, in a location that varies somewhat with the season and also irregularly from year to year, the Gulf Stream ceases to be a "river in the ocean." Having lost most of its initial velocity and swung far to the eastward under the effect of the earth's rotation, it here encounters the cold southward-flowing Labrador Current, by which its progress is still further retarded and its temperature is reduced. The Gulf Stream proper gives place to the Gulf Stream Drift, a general eastward movement of waters over a vast area under the influence of the "prevailing westerly" winds, at a speed averaging one-sixth to one-seventh that of the Gulf Stream off the Florida coast. A branch of the Gulf Stream Drift turns southward on the eastern side of the Atlantic and eventually joins the North Equatorial Current, other branches flow off to the northeastward, passing the British Isles and the Norwegian coast and penetrating far into the Arctic Ocean, and one, swinging off to the northwest, passes through Davis Strait to Baffin Bay.

In the foregoing brief description of

the Gulf Stream and the currents connected with it, we have noted the part played by the winds in maintaining the movement of the waters, both in the trade-wind belt to the south and in the region of westerly winds to the north. The winds are by far the most important agency in controlling ocean currents and, as carriers of heat and moisture, they spread the influence of these currents over adjacent lands. The relations of winds to currents are, however, extremely complex and puzzling, because, while the currents are driven by the winds, the latter are profoundly influenced by the currents. This influence is exerted through the effects of water temperature upon the temperature and hence upon the density and pressure of the overlying air. Cold water tends to build up a high-pressure system, with a certain circulation of winds around it, warm water, to build up a low-pressure system with a different circulation of winds. Both the direction and the force of the winds are controlled by these pressure systems. In the North Atlantic there is a vast permanent "high" or anticyclone on the border of the tropics, variations in which affect the strength of the trade winds, and there is a persistent "low" or cyclone, located often enough near Iceland to have acquired the name of the "Iceland low" (though it sometimes travels far from home), which has a great deal to do with the kind of weather wafted by the ocean

breezes to the shores of Europe. Lastly, although in middle latitudes there is a general drift of the atmosphere from west to east, the so-called "prevailing westerlies" are frequently interrupted locally by small eastward-moving cyclones, with their attendant winds, and in crossing the ocean these cyclones doubtless vary somewhat in intensity with the temperature of the water over which they pass.

The weather of eastern North America is much affected, through the action of the winds, by barometric conditions off the Atlantic coast, and therefore cannot be entirely unaffected by any changes that may occur in the temperature, location and area of the Gulf Stream. The amount of influence exerted by the Stream in this connection is, however, quite problematical.

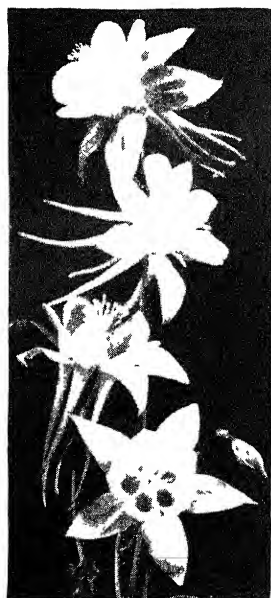
Europe lies far away from the Gulf Stream proper, but adjacent to the huge expanse of the Gulf Stream Drift, which is a body of relatively warm water, and from which the winds blow prevailingly toward the land. The mean sea temperature off the Hebrides is more than 47° higher than



off the American coast in the same latitude and in the course of the Labrador Current. While it is true that the mere presence of an ocean to the windward gives western Europe an equable climate, the relation of ocean temperatures to the mildness of the climate is illustrated by the fact that in the Faeroe Islands when the wind blows from the Gulf Stream Drift to the south and west the air is 12° warmer in winter and upwards of 3° warmer in summer than when it blows from the cold East Iceland Current to the north. If the warm waters west of Europe were replaced by cold, the climate of that continent would certainly be much altered, and it can hardly be doubted that temporary variations in the warmth of the waters are reflected in European weather.

There has been much talk about the possibility of making long-range weather forecasts, especially for Europe, on the basis of temperature measurements in the Gulf Stream, or perhaps of going even farther back in the chain of events and predicting European weather from the strength of the trade winds. These projects assume that the warmth of the Gulf Stream Drift is due mainly to heat brought from the tropics by the Gulf Stream, and they also depend upon the fact that the waters of the ocean travel slowly—taking several months to cross from Florida to Europe and more than a year to

(Continued on page 126)



A TRINITY of LOVELINESS

Columbines Possess Handsome
Flowers, Graceful Stems And
Beautiful Foliage

by Albert A. Hansen

THE LONG-SPURRED COLUMBINE
*One of the finest of the new varieties gracing the
garden plot*



HAVE you a rock garden, a border that needs new life, a rocky ledge that needs a touch of color, a wooded area to be beautified? Then you have the background for one of our loveliest and best-mannered garden perennials, the graceful, nodding columbine

There is a certain delicacy and colorful charm attached to columbines that no other garden plants possess. Where else can be found such sheer beauty of floral form and color, such graceful stems to give magnificent carriage to the entire plant, such singularly attractive fern-like foliage? This trinity of beauty cannot be matched in the entire realm of garden plants.

Columbines are perennial members of the genus *Aquilegia* in the buttercup or crowfoot family, although three species, *caerulea*, *glandulosa* and *vulgaris*, cease blooming after the second or

third year and are best handled as biennials.

Although most species of columbine grow naturally in rocky or gravelly situations, they respond well in almost any well-drained soil except in the lighter lands of the southern states. Aside from southern California, columbines do not thrive in the South.

The cultivation of columbines in Europe and Japan is many centuries old since the beautiful plant has long been a garden favorite. The discovery of America added a few new species to the European and Asiatic forms, the principal new world kinds being the red columbine, *A. canadensis*, of the New England and middle Atlantic states, the Colorado or blue columbine, *A. caerulea*, of the Rockies, the striking golden columbine, *A. chrysantha*, of New Mexico and Arizona, and the Mexican

A WINSOME BOUQUET CHALLENGES THE EYE
*The last few years have seen the columbine rise
to new heights of popularity*

columbine, *A. skinneri*, from the mountains of Mexico. Although these species have all been

J. C. ALLEN



brought under cultivation, aside from the double forms, believed by many to be less attractive than the wild kinds, they have been little changed by the art of the gardener and plant breeder. There are numerous horticultural varieties, however, of the common European species, *A. vulgaris*, mainly in shades of purple and white.

In general, columbines thrive best in light, well-drained, fertile sandy soil in a sheltered position that is not deprived entirely of sunlight, but they seem to do well massed in clumps in exposed borders as well as at the edge of wooded areas and in the shade of trees. I have in mind a rocky slope in the garden of a city home that is spotted with brilliant patches of columbines nodding gracefully from rock ledges, giving a touch of color under trees and even competing with turf for a chance to express themselves.

Columbines are charming alike in permanent borders, at the edges of shrubbery, in rock gardens, along wooded paths, under the shade of garden trees or as cut flowers. They are best started from seed, but they may later be perpetuated by division. Few hardy garden plants are so readily grown from seed, which may be sown indoors in shallow boxes or in coldframes during March or outdoors during April. Early sown seed sometimes gives floral reward during the first season but ordinarily blooms do not appear until the second year. They present a wide color range, varying from pure white to exquisite clear blue, and through lovely soft shades of rose, yellow, purple, red, orange, cerise, salmon and mauve. There are even some striped forms. The dainty, dancing spurred blossoms pirouette at the slightest caprice of the wind, reaching their greatest display during May and June.

One problem in rearing young columbine seedlings is that of keeping the surface of the soil moist. This seems to be necessary if the plants are to survive, but too much moisture encourages the damping-off fungus, so careful regulation is necessary. When started in coldframes the recommendations of Fred H. Horsford, well known Vermont nur-



FOR GARDEN BORDERS

One may choose the common variety, above, or the native Colorado blue, in the oval



(Below)

THE GOLDEN COLUMBINE

This is a native of the Southwest, adaptable to rock gardens or borders, or suitable as a cut flower



seryman and flower grower, seem to overcome this difficulty. Horsford's method is to cover the coldframe with medium heavy cotton which retains just enough moisture to keep the soil in good shape while at the same time permitting sufficient air circulation to ward off the dreaded damping-off. Seeds sown in the open, however, escape these difficulties but the seedling soil must be kept moist. When the coldframe seedlings reach sufficient size they are

transferred to the open where they must be given shade for a few days until firmly rooted. Once started, columbines respond well to ordinary garden culture. In the colder parts of the country a mulch of leaves or straw may be necessary during the winter. Occasionally, particularly in too rich soil, the foliage becomes a bit shabby but this fault is easily corrected by trimming, since the perennial roots soon renew leaf growth.

Raising one's own seed in the garden is a simple matter providing but one variety is

grown Where several varieties are raised they must be widely separated, since practically all columbines hybridize freely It is for this reason that columbines, even from the best seedsmen, may not always come true to name and one must be exceedingly charitable in this respect A desirable feature of columbines is the fact that the red species, of which our native *A. canadensis* is an example, attract busy little ruby-throated humming birds that attend to the business of pollination.

There are over a score of species of columbines with dozens of varieties that offer a wide selection of form, habit and color For ordinary garden purposes the Mrs Scott Elliot strain of long-spurred hybrids, an importation from England, is perhaps best The long-spurred hybrids are the latest and finest products of the columbine breeder's art and they are now offered by practically all dealers in mixtures that include a bright display of white, blue, pink, rose, red and yellow, no two flowers seeming to be exactly alike The long-spurred hybrids are strong, thrifty plants growing to a height of about two feet with large, charming flowers that appear during spring and early summer Fortunately, these new perennial creations do well in ordinary garden soil and they are well adapted for borders or bouquets.

When pure species of columbine hybridize in the garden the result is usually an undesirable strain Aside from the long-spurred hybrids, the most popular garden species for borders, clumps and cutting are the native red columbine, *A. canadensis*, the native Colorado blue or Rocky Mountain columbine, *A. caerulea*, and the English *A. vulgaris*

The native red columbine, although frequently found in gardens, is a true creature of the wild that loses much of its graceful charm by sprawling out when cultivated Seeds may be gathered and sown during midsummer for bloom the following season It is a most attractive species with red, yellow-throated blossoms that appear from April until July Its favorite haunt in the wild

is on woodland limestone ledges where the bright blossoms dance in the wind like tiny balls of fire

The Colorado columbine, the floral emblem of its native state, is particularly attractive with its large sky-

blue to white blossoms measuring sometimes three inches across, and its long, slender spurs tipped with greenish knobs The entire plant grows to a height of about eighteen inches, the leaves are three lobed in true columbine style and the plant is of easy culture in well-drained sandy soil in exposed situations. The horticultural variety, *A. florepleno*, features large double blossoms that are too crowded to be considered much of an improvement over the wild form

A common garden variety of the English *vulgaris* species is *A. nivea grandiflora*, or Munstead's White, noted for its profusion of huge, pure white blossoms borne on stout stems that curve gracefully under the weight of the flowers The blooms appear early, a worthy vanguard for the long-spurred hybrids that make their floral debut later. Munstead's White does best in a somewhat sheltered situation with plenty of sun and is well adapted for borders, cutting or rock gardens This variety is best started from seed and is a true perennial of easiest culture that may later be propagated by root division, as may most species of columbine.

A fine American contribution is the golden columbine, *A. chrysantha*, a native of our own Southwest that attains a height of three to four feet. The numerous bright yellow, fragrant blossoms with slender spurs sometimes exceeding two inches in length, are poised vibrantly on long slender stems The attractive foliage is somewhat darker

than in other species It is a hardy perennial adapted to rock gardens, borders or for cut flowers, that may be propagated by division of the clumps or by early sown seed to which it usually comes true A variety *alba* has pale yellow blossoms merging to pure white that are unsurpassed by any garden flowers.

Among the best of the rock garden species is *A.*



WHAT COULD BE MORE DAINTY?
One of the important reasons for the columbine's steady climb to flower fame

glandulosa, a lovely plant that seems distinctive in not crossing freely with other varieties. Then there is *A alpina*, the alpine columbine, another fine rock garden form with showy blue flowers. This thrives best on sandy loam or peat soil in a moist, sheltered situation that is not too shady. A charming variety, *superba*, may be had with white-centered flowers. Closely allied is *A reuteri*, at home in the open in poor soils. America has also contributed a miniature alpine species, the fine little *A jonesii* from the Rockies that is unusually well adapted for rock gardens.

The well known *A viridiflora*, a species with curious sage-green flowers and delicately tinted leaves that impart pastel effect, cannot be neglected, and there are also many devotees to the Californian columbine, *A formosa*, a singularly beautiful species somewhat resembling the common red columbine, that thrives in rich, moist places. It hybridizes readily and is unusually attractive on account of the manner in which the petals are edged and lined with gold. The Californian columbine is native to western valleys as far north as Alaska. Then there is the popular *A skinneri* from old Mexico, an exquisite species with orange flowers possessing bright red spurs. Although offered by many dealers, the true form of *A skinneri* is said to be rare.

As with all popular garden plants, novelties appear from time to time. A novelty form is *A longissima*, distinguished by the unusually long spurs.

A number of Siberian species, handsome affairs with lilac-blue blossoms, short, blunt, incurved spurs and included stamens, have lately appeared in increasing numbers on the American market. Among the best of Siberians are *A glandulosa*, *A oxysepala* and *A sibirica*. All of these forms are as vigorous and hardy as lilies but must be treated as biennials.

From the gentle clime of Japan comes the fan columbine with white corollas set off by lilac sepals. Thus all corners of the northern hemisphere from Japan to Siberia, Europe, Alaska, America and Mexico have contributed fine species for the home garden.

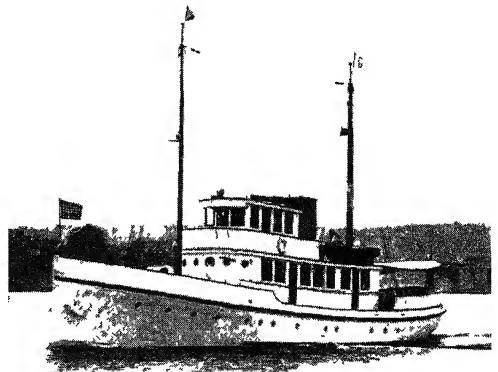
An excellent quality of garden columbines is their

relative freedom from pests. Their worst enemy is the borer, a striped larvae that tunnels the stems and causes the entire plant to wilt and droop. Usually all that is necessary to defeat the plans of borers is to pull and burn the first crowns that show signs of this trouble. The handsome, maiden-hair-like foliage occasionally becomes disfigured by leaf miners, tiny fly larvae that feed between the leaf surfaces leaving light-colored, serpentine trails in their wake. The infested foliage should be stripped and burned as soon as miner injury becomes apparent. The miners can also be repelled with a nicotine sulphate solution. Spading the ground around the plants during March before the flies emerge is helpful.

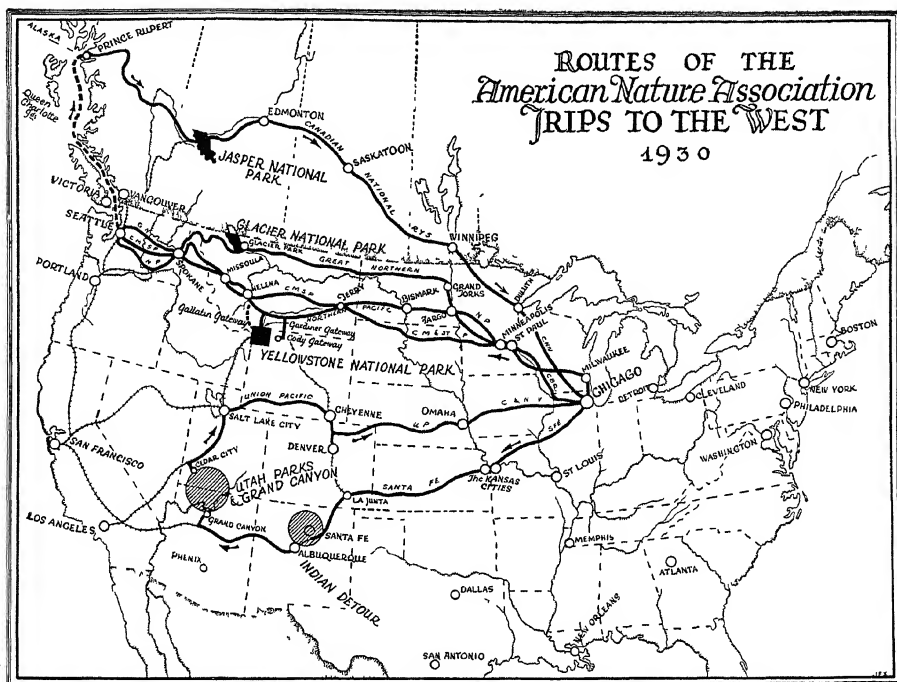
The only other insect enemy that has been reported on columbines is the common aphid or plant louse that occasionally stunts the growth by clustering on the terminal stems. Once again spraying with a nicotine sulphate solution or an application of nicotine dust will prove highly beneficial. These materials may be purchased from dealers and directions are usually furnished. The common form on the market is a forty per cent nicotine extract that is usually diluted with eight hundred parts of water for ordinary garden work.

A single fungus is known to be destructive to columbines, the southern root rot, if the damping-off fungus of seedlings is excepted. This is the same parasite that attacks iris, phlox, golden glow and other ornamentals. Southern root rot can be controlled by watering infested plants lightly with corrosive sublimate dissolved one ounce in twenty gallons of water, or with a similar solution made from one of the new organic mercury compounds that have recently appeared on the market and that are now offered by dealers.

The charming characteristics of the columbine are unique in flowerdom. For the part it plays in the garden it has no rivals to take away its glory. To see its sprightly tri-parted leaves surmounted by the delicate blossoms nodding on their graceful stems along a border or in a rock garden is to realize that the claims made for it are not exaggerated. It is truly a trinity of loveliness.



INSIDE AND OUTSIDE THE GOOD YACHT CAROLINE
Views of the yacht which, with her sister ship the Westward, will carry members of Nature Magazine parties through the Inner Passage of British Columbia from Seattle to Prince Rupert during the coming summer



ON WESTERN TRAILS

American Nature Association Announces Its 1930 Trips

THROUGH the mountains and beside the lakes of Jasper Park, Canada, into the bays and inlets of the untouched wilderness of British Columbia's Inner Passage, over the trails and to the chalets and tent camps of Glacier National Park, to the many wonders of Nature at play in the Yellowstone, and into the region of color and grandeur in the Southwest, American Nature Association parties will go this year.

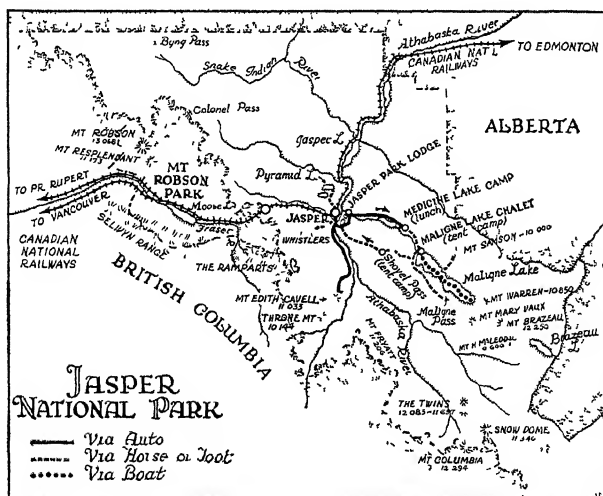
The three parties that visited Glacier National Park during 1929 proved beyond any doubt the value and appreciation of such an endeavor. They proved that the worthwhile people who form the membership of the American Nature Association and the readers of *Nature Magazine* are eager for what is at once a real vacation in the outdoors and an experience of permanent value. Also, they provided something different in summer trips.

At the earnest urging of members of the 1929 parties and because there is no inconsiderable responsibility to continue this activity,

we have been at work for the past several months on more extended plans for 1930. These plans are so varied geographically, and cover so much of interest that it is impossible to present them in detail in the pages of *Nature Magazine*. A booklet has been prepared, however, and given the title *On Western Trails with the American Nature Association*. It will be mailed to all interested.

Briefly, however, it may be said that the trips that link Jasper Park in Canada with Glacier National Park, by way of a private yacht trip through the Inner

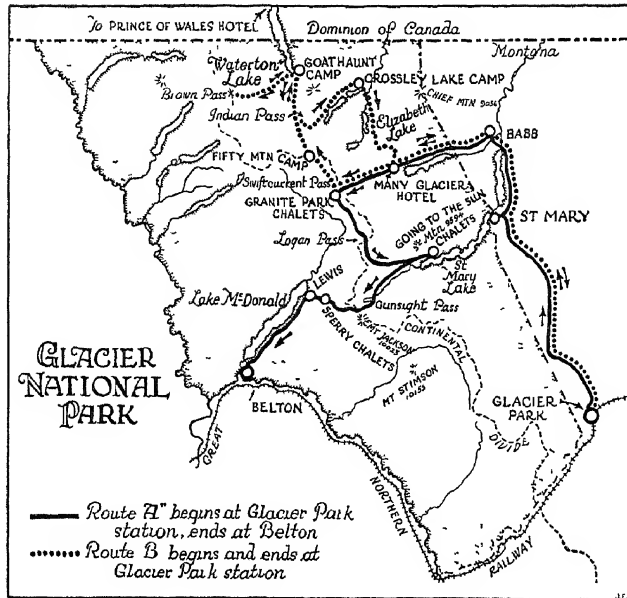
Passage of British Columbia, are not duplicated anywhere, and may be safely described as one of the most notable outdoor experiences available. The Yellowstone, mecca of thousands of tourists every year, is a Park which should be in the experience of everyone and will be seen by our parties from our particular point of view. For the Southwest there has been mapped out a trip which includes all that can conveniently be



covered in one trip to this section, having, at the same time, sufficient leisure to gain the sort of knowledge of the country that our parties seek.

For the glorious yacht trip up and down the Inner Passage of British Columbia, the American Nature Association has chartered two yachts, the *Westward* and the *Caroline*. Many will recall that the *Westward* carried our expedition to the Pribilof Islands and there proved her ability in any kind of seas. The *Caroline* is her sister ship. Both are outfitted with equipment for camping ashore and with small boats for the various adventures the party will have in this primeval country where Nature reigns supreme. Few see the Inner Passage and its shores as the American Nature Association parties will see it, because the larger boats to Alaska must stick to the deeper channels while our yachts will find night anchorage in secluded and, often, unnamed bays. We cannot conceive of a more perfect vacation for one who loves the outdoors than a trip which links Glacier Park and Jasper Park by way of one of the most fascinating bodies of water in the whole world,—the Inner Passage.

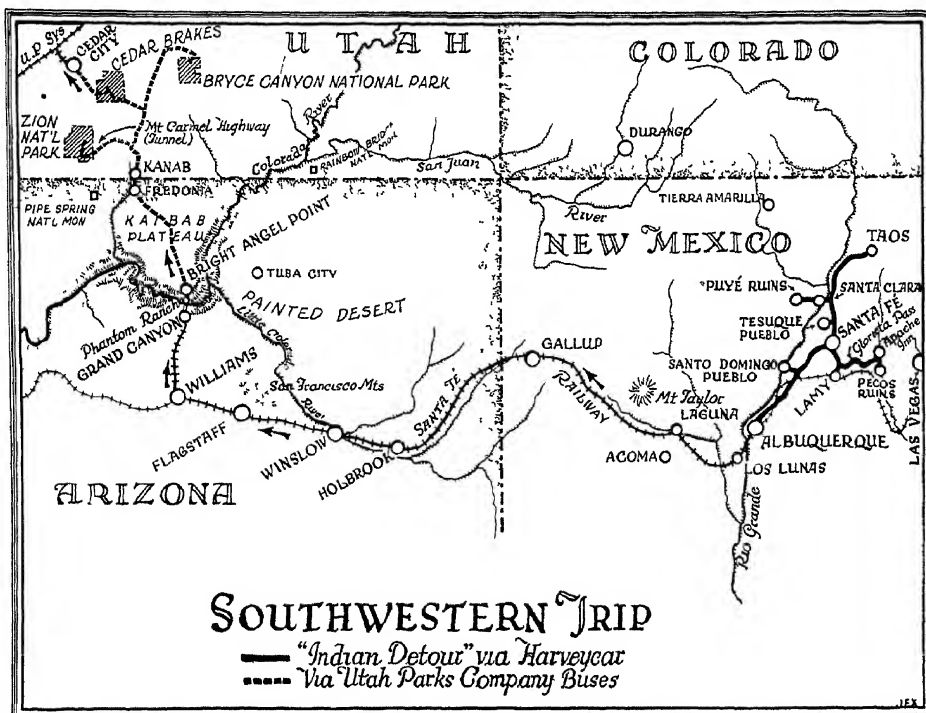
All of the parties will be limited to not more than twenty members, and in two instances to fewer. In

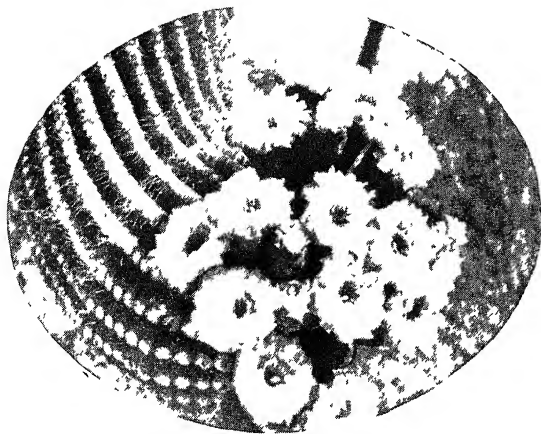


reality they are family parties with representatives of the Washington office as nominal heads of the families and with our naturalists along as "one of the gang." The American Nature Association trips are not tours in the usual sense of rushing from one point of interest to another in large groups. They are not commercial enterprises. They are, instead, trips for those who love the outdoors and what it holds, who are "good sports", who are willing to take the fortunes of the trail as

they come and who want to take back from their vacations more than hurried glimpses of what they have seen.

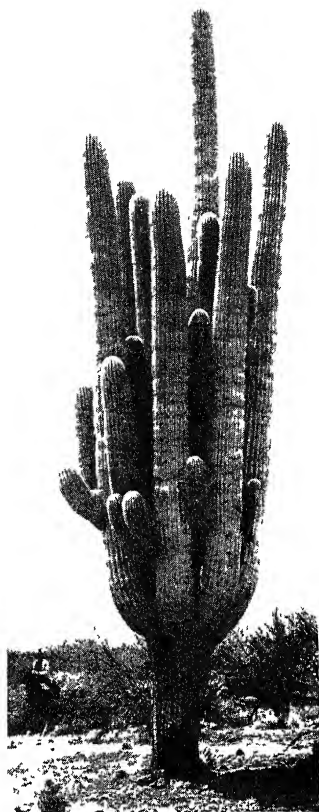
On these pages there are reproduced maps showing in general and in detail the routes to be followed by the several parties that will go afield this year. However interesting such maps may be, obviously they can hardly hope to more than suggest the beauty and charm of the country to be visited by the various groups. In the booklet, *On Western Trails*, we have attempted to describe with words what one will see and do, and even these often seem inadequate, particularly to those of us who have already visited Glacier, Jasper, the Southwest, the Inner Passage and the Yellowstone. Send for the booklet, however, and see whether it does not describe something of interest for your vacation plans and something different





(Left) FLOWER OF THE SAGUARO, OR GIANT CACTUS STATE FLOWER OF ARIZONA

At the right is a giant cactus in the Tonto National Forest of Arizona



Our VANISHING CACTI

Commerce and Carelessness Threaten These
Distinctive Native Plants

by Marian MacLean Finney

IN THE quivering heat of the desert, two passengers leaned back against the cushions of an automobile moving slowly along the road. They were a trifle bored with the gray-greenness and the dust. Suddenly one leaned forward, caught by the view of patches of red and yellow, pink and purple, which festooned the ground or stood like apparitions between them and the sun. The car halted with a jerk. There were exclamations of wonder. The ennui of the desert trail was over. From then on the desert sands had a message.

The color was that of flowers,—strange flowers, gorgeous but stiff, handsome but unapproachable. They were growing grotesquely on plants of a most forbidding and churlish appearance: thick, leafless, jointed stems from which protruded numerous and dangerous thorns. They were tall or short, a gray-green, barrel-shaped mound, a clumsy looking, branching bush; a small tree, or merely a series of spiny balls along the ground. There were a few large and showy single flowers, and cluster of tiny ones. Some thorns or spines were long and sharp as

a bayonet, others took the form of hundreds of stickers so fine they could scarcely be seen. Innumerable were the variations.

Among all this numerous family of cacti, only a few disreputable members are well-known, such as the "horrible cholla" which sheds its spines on every passing object, inflicting painful wounds. Most of these kinfolk, however, have lived to some purpose. The tiny burrowing animals count their cruel appearance a blessing, and birds take to their branching arms for refuge, both depending upon the thick barbs to repel enemies. The Indians used thorns of cactus for fish hooks and

for needles; ate their fruit raw or made it into jelly; and distilled a cooling beverage from their juices. The early Spaniard planted them for fences and enjoyed their decorative effects in his garden. Within the last decade, Luther Burbank developed a variety without spines to be fed to cattle and horses, a rival of the nutritious alfalfa. The modern candy factory keeps the desert roads alive with trucks, hauling away,—often to a shameful waste,—thou-



CHOLLA CACTUS, COLORADO DESERT, CALIFORNIA

A disreputable member to the human but a haven to burrowing animals and the birds

sands of plants, usually the large barrel cactus. In Mexico, cactus is made to yield both rubber and varnish, and everywhere curio makers carve from it pin cushions and napkin rings, bowls and baskets.

Thus the cactus, for generations, has befriended man, and now man has awakened to the fact that he must defend the cactus, for many varieties are repeating the tragedy of the American buffalo, the desert big-horn sheep, and numbers of our birds and wild flowers. They are disappearing fast and needlessly through the carelessness of those who seek them for various purposes, and through ignorance of their habits and helpfulness. In order to protect them and certain related plants, a "Cactus and Succulent Society" has recently been organized, with headquarters in Los Angeles.

Despite its recent organization, the society now has nearly three hundred members scattered from New York to California, and from Texas to Canada. Several branches have been formed in different parts of the country, working under the Los Angeles headquarters. A friend who desires

to remain anonymous to the public has offered the new Society a ranch of one thousand acres in Arizona, but this brings with it the grave question of development expense, water and other details, and so this generous gift may have to be refused altogether or its acceptance delayed until the Society has sufficient funds in hand for a steady payroll. It is imperative, however, that some ground shall be secured as soon as possible in order that certain nearly extinct varieties may be planted and conserved, in much the same manner as the Government has established forest reserves.

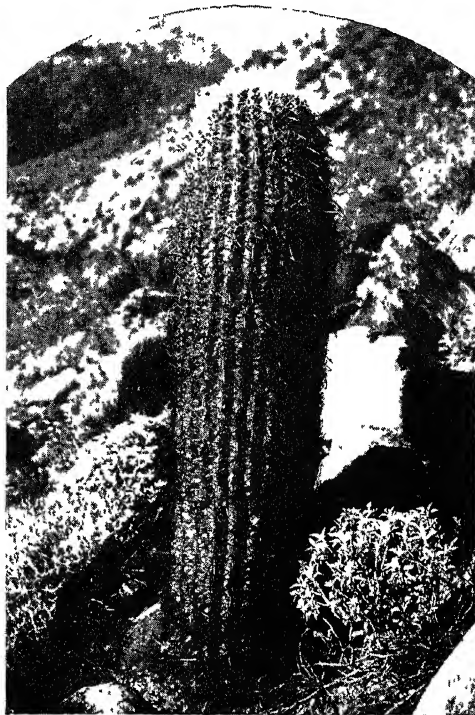
Botanically, this Society is interested in the Xerophytes, natives of dry habitats like our deserts, and in the Halophytes which grow in saline soils. Both families are distinguished from other plants by their more-pronounced water-storing tissues and for surfaces which

neither absorb nor exude moisture to any extent. This means thick stems, firm skin, small leaves or none at all, and sometimes spines. Examples of these plants are known to most of us by their common names, such as the century plant (rather than "agave"), hen-and-chickens, yucca, cactus, and by far the more numerous are the cacti and their progeny.

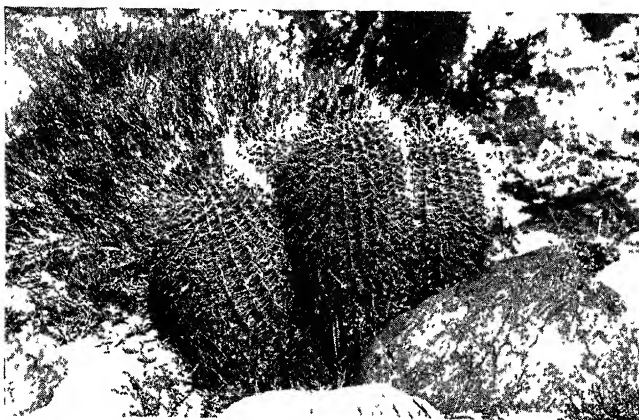
They deserve protection, for they have lived usefully but not easily. The roots of the cactus must penetrate deep into the earth to draw even a feeble sustenance, and it has had to change the normal manner of plant-life by dispensing with the beauty and utility of leaves, and by hardening its skin to keep from giving out its moisture in evaporation. This tough covering, with its numerous bristles, shuts out the rays of the fierce desert sun, as well as shields the plant from the raids of large herbivorous animals that would feed upon the life-giving moisture hidden within its thick stem and roots, so hardly wrested from a discouraging soil.

The cactus deserves our admiration because of its bravery and persistency under adverse conditions, where other plants have mostly given up the fight. For this, it appeals to our sense of fair play that it should now be given a chance for its life. Furthermore, it appeals to our patriotism because it is a native American. From the United States, as well as from Mexico, it has been carried to other parts of the world, its unusual beauty and its usefulness appealing universally. Most of all, its helplessness appeals to us. For two centuries and more we have availed ourselves of its aid. Now shall we see it despoiled and wasted?

This new Society plans a campaign of education. Summer campers will be asked to let it grow. School children will be instructed in its care. Householders will be enlightened as to its points of beauty for garden decorations. The Society will also foster appropriate legislation which will make it unlawful for commercial houses (like candy companies) to over-exploit it.



A LARGE BARREL CACTUS
Thousands of these plants are being hauled from the desert



WELL-NAMED THE HEDGEHOG CACTUS
At last these plants of the desert have an organization seeking to protect them from the inroads of commerce that they may not be wiped out

SECRETARY RAY
LYMAN WILBUR

Head of the Interior Department, who calls for action in conservation



HARRIS & EWING

HE STARTLED THE
ENTIRE NATION

By his proposal to give the public lands back to the states

THE United States Government has played dog-in-a-manger with the 186,000,000 acres of public land long enough

"If it will not act, and promptly, to protect them from fire and over-grazing, to save the water supply vitally necessary to the West, then the states, which could do no worse in the next twenty years than the Federal Government has in the past twenty, must take charge.

"The day of the bureaucrat, utterly ignorant of conditions two thousand miles away from his Washington office, the day of no control, which has practically permitted anyone, at any time, to do what he wished with the surface of government land, is at an end

"Now is the time for *conservation*. The era of words is over "

The speaker was Secretary Wilbur. His voice thrilled with conviction. He snapped out his words like a general giving commands. His eyes, always keen and bright, burned with the intensity of his thoughts. He typified action.

"Water is the key to the future in the West," he went on, his sentences staccato. "From Nebraska to the Pacific, the great states can grow only as they find it, store it, preserve it. Behind the water lie the plants, preventing erosion and protecting the watersheds.

"What is happening? Now the plants are cut to the ground by over-grazing, burned to the roots by fire. Each rain brings thousands of tons of earth away from the hills, choking the reservoirs and tearing down the watersheds, because there has been no adopted policy

"Here!" He jumped to his feet, unfolded his great height of six feet four, and reached up to the map of the United States covering one wall of his office in the Interior Building. His long arm moved up and down the West Coast; his tapering fingers, long-trained by practice of medicine to delicate touch, traced in and out of the Western Valleys.

"I know this country. Once covered knee-deep with bunch-grass, capable of feeding mighty herds, capable of holding the earth with its roots against torrential rains, and storing up the water, to give it up in more even quantities to the rivers. Now what? Bare, brown

stretches, cut by gullies that each rain deepens, because of over-grazing. The forage is gone. Erosion is taking its destructive toll. Another great American Desert is in the making.

"This is government supervision. If it is the best the government can do, let the states have a try, as I recommended in my Boise, Idaho, speech."

Because of the now-famous Boise speech I had been sent by Nature Magazine to Secretary Wilbur, to find out more concerning his public land beliefs. He had aroused the country when he said, "It is time for a new public land policy which will include transferring to those states willing to accept the responsibility the *control of the surface rights of all public lands not included in national parks or monuments or in the national forests. With sound state policies based on factual thinking it may eventually develop that it is wiser for the states to control even the present national forests.*"

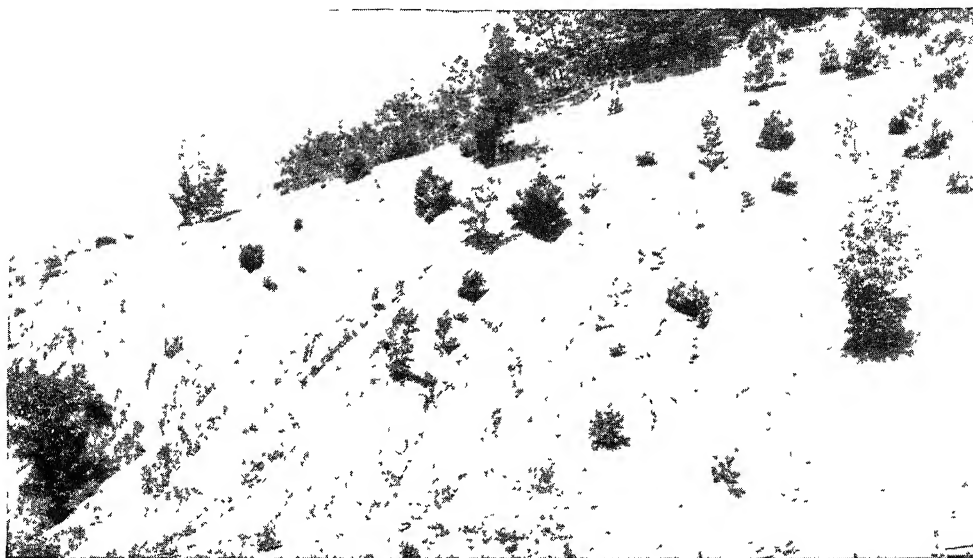
Editorials, many opposing his ideas, had filled the

ORPHANED ACRES AND UNCLE SAM

What Secretary Wilbur Thinks of Both

by Paul F. Hannah

Assistant Editor, Nature Magazine



U. S. FOREST SERVICE

AS MANY ACRES LOOK TODAY

The Government has largely abandoned its orphan acres allowing them to be over-grazed and runned

press. Indignant groups of foresters fell on his suggestions regarding the national forests, and they tore them piecemeal with a fear born of the days when the Interior Department was selling forest lands wholesale. Under the storm he had retracted nothing. What was he going to do?

He had received me with courtesy. I told him what I wanted.

"Do you come here to talk Nature or politics?" he had asked. "I am not interested in political machinery but in results. The desert plants and those of the mountain side want rain and nourishment, and do not know in which state they are living. All I care about is seeing that they obtain what they need and gain protection, regardless of whose jurisdiction they are under. State or National government—it makes no difference which agency does the work, provided it is done."

I professed my ignorance of things politic. But what did Mr. Secretary have in mind when he spoke in Idaho?

A slow smile played over the thin face. It broadened to a grin. One might imagine that sitting there, instead of the Secretary of the Interior, was the Stanford schoolboy of thirty-five years ago, up to some collegiate manoeuvre.

"You will have to admit the talk startled many people. Perhaps that was what I had in mind. After years of inactivity, only bombshells are effective as alarm clocks. Now every person is focussing his gaze on these myriad plants, that are so important in our future development. Perhaps, now, we can get somewhere!"

So this was the reason! Secretaries of the Interior had come and gone. The Land Office had drowsed through the winter winds and the summer heat in its Washington home, Congress had met, talked and adjourned on Capitol Hill, as Congresses do, the states, too, had had their fill of sleep, while the great land problem remained unsolved and ruination went on apace.

Real estate—acres of sage and forage, stretching flatly under a blazing sun—was prosaic, it lacked color, romance. A new secretary stepped in, and, by a brilliant manoeuvre, gave the land problem its glamor. He set

tongues wagging, either in praise or condemnation. Very few could do that. And very few could sit

in their offices days after day, chuckling over the withering or effulgent telegrams that have followed in the wake of such a speech.

Few realize, even yet, the immensity and importance of the question Doctor Wilbur hopes to solve. It involves on one hand endless tangles of government red-tape, on the other an almost impossible coordination of activity and unity of purpose among and within the states. The answer depends on an understanding of the proper relationship, to the life of the nation, of the different assets of the public domain—the forage, the watershed, the minerals, forests and farming possibilities, and a very nice adjustment of the values of each. It likewise requires Congressmen to cease their log-rolling tactics, and to forget the minor interests of special groups of their constituents to preserve the major interests of the nation.

History shows, however, that Doctor Wilbur's plea has been too long postponed. Once the great desert areas of Palestine fed thousands of head of cattle. It is recorded that on one occasion the children of Israel went forth to war against the Midianites, and brought back over 740,000 animals as booty—and this number probably represented only a small portion of the number that then grazed over the land—yet today Palestine is arid, barren, and treeless, because of overgrazing, and its usefulness reduced to poor agriculture and stock raising. When Coronado made his courageous journey from Mexico northward to eastern Colorado and western Kansas, along what later became the Santa Fé trail, his historian reported: "Who could believe that one thousand horses and five hundred of our cows and more than five thousand rams and ewes and more than fifteen hundred friendly Indians and servants in travelling over these plains would leave no more trace where they had passed than if nothing had been there—nothing—so that it was necessary to make piles of bones and cow dung now and then so that the rear guard could follow the army." One merely has to travel the Santa Fé trail today to learn the lesson

"But perhaps now we can get somewhere," before it is too late. Shortly after Doctor Wilbur's speech, President Hoover appointed his Commission on Conservation and Administration of the Public Domain to discover how grazing can be controlled, how the watersheds can be preserved, what the function of the Reclamation Bureau shall be, and how the ideals of conservation may be established. It is headed by James R. Garfield, and composed of men who are conservationists at heart, and who know the West.

Nor is this committee bound to bring in a report in accord with any pre-conceived policy. There will be no "rubber-stamping" of Doctor Wilbur's professed beliefs. Already, after the first meeting on November 23, it is clear that within the committee itself there are diverse opinions that can be reconciled only after the question has been given the thorough study it deserves.

Doctor Wilbur, however, is frank to admit he is opposed to "absentee landlordism" and the "bureaucrat."

"What does a bureau official in Washington, who has never seen Nevada, know about grazing there? How can any Washington office lay down uniform rules to apply at the same time to Idaho and Arizona?" he asks. "Water is vital to the life of the states, while it is only the academic concern of those working in the Capitol, and they cannot properly understand and control problems connected with it from a distance."

The states, he believes, will in self-preservation take care of their public lands. They have done well with the school lands previously given them, and have already machinery which will be able to handle advantageously the administration of additional territory. No commonwealth is going to sit idly by, he feels, to watch another state out-distance it because of better management of the grazing problem. The states know local conditions. They know how to meet them in private enterprise.

Of course, there are many instances where the watersheds of one state supply water to another—as Montana's mountains furnishing the life-giving supply for the plains of Utah. In such cases, Secretary

Wilbur believes, regional agreements—treaties or compacts, if you like—will work out the problem.

But what of corrupt legislatures? Of governors bought and sold by the grazing interests? Doctor Wilbur admitted that here was a matter giving pause for thought. But he had an irrefutable answer.

"If the states do nothing, they cannot do worse than has the national government."

He indicated with a wave of his hand four books sitting on a table behind him. These were the beautifully bound volumes containing the report of the Public Land Commission appointed by Roosevelt twenty years ago. The Commission, in 1905, had warned the country that grazing must be controlled, and the range restored, or the West would be destroyed. It had secured the National Forests, but the range had been forgotten.

The sweep of his arm was dramatic. It indicated, clearer than words, that the beautiful bindings were the chief tangible product of the months of investigation of the range's needs.

"Of course," he pointed out, "no lands can be granted the states until the ideals of conservation upon which the future of the nation depends become inscribed into their policies. They must first be shown how necessary to their very existence Conservation is. The broad policies which each commonwealth must follow will be established by Congress in giving the surface rights to the lands. They will administer them in accord with these policies. Perhaps it will be desirable to insert a condition subsequent in the grants, causing the land to come back to the government if mismanaged. Every safeguard will be put around the public domain."

"But until we can take a step, we must await the committee's report."

Such, then, are Secretary Wilbur's ideas on the public land question. They label him as a deep-thinking, yet active conservationist. For him, conservation is no academic affair, to be the object of idle theorizing. It is fundamental—immediate. It calls for a solution, one divorced from politics, from every factor but

PROTECTED LAND MEANS WATER

Here, trees and forage will soak up the rain, prevent erosion and the clogging of vital reservoirs



U S FOREST SERVICE

the welfare of the nation. He believes that the states, as administrative units, can handle the watershed problems better than a bureaucratic government, once the ideals of conservation are developed by the federal government. But, like President Hoover, he is willing to accept the findings of the Commission and rely upon them.

His under-chiefs and those who know him have long called Doctor Wilbur "the High Priest of Conservation." They say, at the Department, that he talks the subject all of the time. And after listening to his emphatic phrases, one can realize that it is no mere empty title. When he talks of his beloved West and its land problems, his thin, large-boned face glows, his deep-set gray eyes brighten, the gestures of his prominent, nervous hands become rapid, sweeping,—his entire frame seems on the verge of motion.

Already, after but a few months in the cabinet, he has a fine record of achievement. Within ten days after assuming office, he had opened a pathway for solution of the oil conservation problem, and had halted the mad race which was exhausting the great fuel reservoirs lying under the earth. He stopped the issuance

of permits to prospect for oil on Government land, and withheld his signature from all oil leases except under extraordinary conditions. He helped to find a means to control drilling and eliminate waste in the oil industry. He suggested state agreements and his ideas are already in practical use in the Kettleman Hills oil fields.

He has paved a way for more efficient governmental handling of conservation affairs. The reindeer, for example, long the problem of the "school marms" of the Bureau of Education, follow all the other natural resources of Alaska, scattered over a dozen or twenty different bureaus, into the portfolio of the Governor of our most northern possession. He has suggested many other changes in government bureaus, eliminating inconsistencies and duplication of work. He is quite eagerly working for the alignment of the Forest Service with Reclamation, Lands and the Park Service, but frankly says that he cannot see ahead the day when the National Forests will be administered by the states.

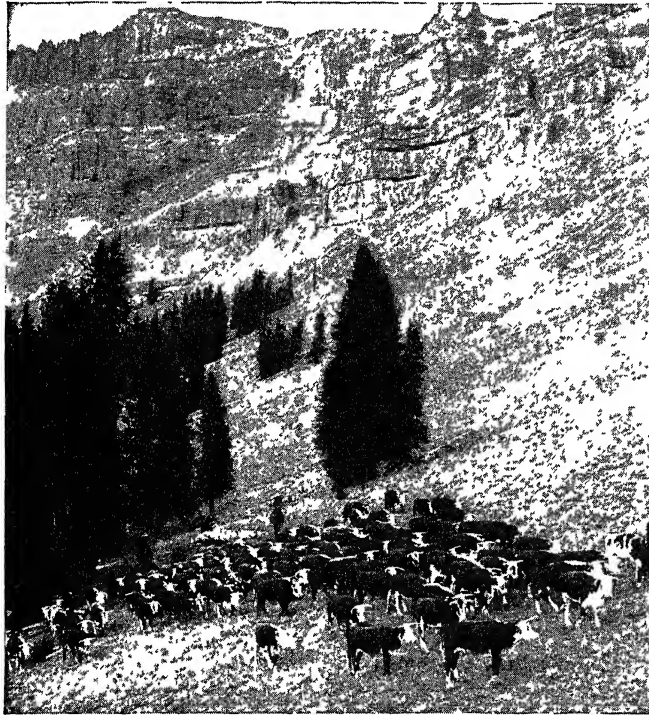
One of his pet ideas is the conservation of the desert. He wishes to keep the giant cactus, the mesquite, the yucca, the horned toad, and even the rattlesnake as a part

of America's wild life. Perhaps one day,—who knows?—Science will find a use for them. In any event, they are part of the heritage of frontier days, and deserve ample representation in the great museum of the out-of-doors.

Secretary Wilbur is an "outdoor" man. It told in the expression of his tanned, weather-marked features, that afternoon, when he caressed with his fingers the hills and valleys on the map of his beloved California, where he had wandered through so many sunlit days. It is apparent during the summer months, when, as the President's companion, he travels up to the

Rapidan to cook trout over a wood fire, and to roam the Virginia hills.

A lesser lover of the out-of-doors might not have been prepared to take his stand on the firing line in the public land controversy so soon after assuming office—only with a basis in first hand knowledge gained by tramping over the eroded hills could the situation be so clearly, vividly and romantically pictured to the people. A man with less idealism and imagination might not have dared to leap so far in the van of public opinion to voice an idea entirely revolutionary, unexpected and

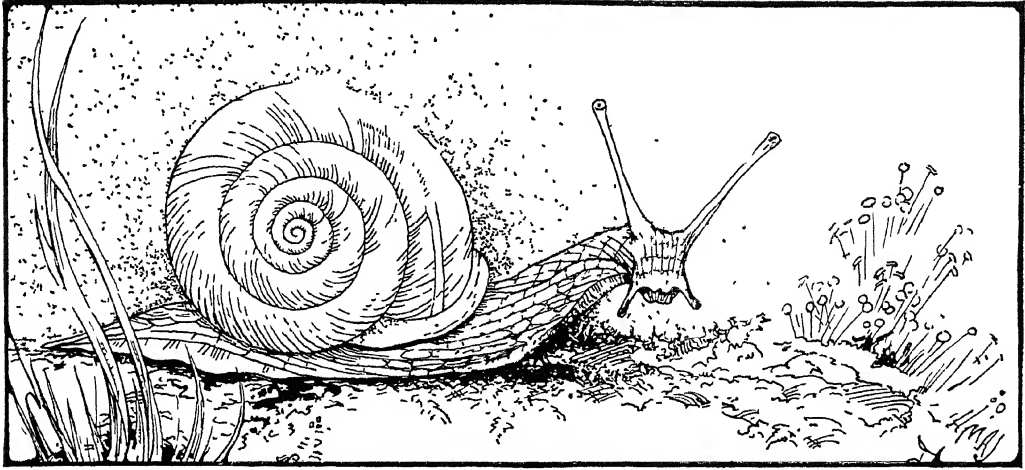


U. S. FOREST SERVICE
HELPING TO MAKE AN AMERICAN DESERT
These animals, in too-great quantities, are stripping the West while the Government does nothing about it,—as yet

involving new precepts of government.

Perhaps his ideas are not the popular ones nor the ones that will be finally accepted. Perhaps they have made him enemies. But his vision of the West is a sure one, and his voice, crying as it were from the wilderness of ignorance, has startled the country to the verge of action—which is the biggest service of all. He has taken off the bandage from the eyes of the people, and made them realize they must solve a pressing problem. He has made them see—see the torn watersheds, the reservoirs filling with silt, and the herds destroying the forage, see the government standing still, while the Western cry for water rises strident from over the growing desert.

It takes a man to crank the governmental machine. It takes a fighter, a dreamer, and above all, a man with a sense of humor so necessary to reading withering telegrams. It takes a person with imagination and enthusiasm to run so far ahead of his day that he can gaze around the next turn in history. But Ray Lyman Wilbur, son of California's over-grazed plains and eroded gullies, doctor, college president, food conserver, believer in water, is such a man.



The Life of Nailie

A Little Snail Brings Happiness to a Home

by Muriel A. Jaisohn

SHE was on an oak leaf when I found her, taking a snail's-eye view of the great and towering wood, drowsy with the sleepiness of a winter just past and wet with the wetness of an early spring rain. She was a young though full grown Gastropod, one of the shelly land variety, and she was pale and lovely to look upon.

I picked her up to look more carefully at such an elfin creature, but the sudden action and touch frightened her and she drew very quickly into the innermost region of her shell, literally closing the door in my face, for, as I looked, only a glazed film was visible to show that the shell contained any life at all. So I put her gently into my pocket and took her home.

With a small wooden box for walls and floor of a home, fine wire for sky-light and fresh green moss for furnishings, the little snail took up a new life. "Nailie" became her name. For a day or two she sulked within her shell and any movement caused her to withdraw deeper and yet deeper into the spiral of her house.

Soon, however, a youthful appetite and feminine curiosity had to be satisfied. There was a slight motion of the shell, a little click, and first a tiny jaw cautiously appeared. Then an eye peeped out from beneath the protecting eave, and a tentacle was waved delicately around. These were followed gradually by the rest of her body and she gazed unhampered and unprotected on the new, foreign world. How strange and weird it must have seemed!

We were delighted. But alas! Our whispers and movements and the jarred box caused her again to slam her door in fright and from thenceforward we viewed her surreptitiously and at a distance. But snails, like people, cannot mope forever, and besides, she must have been very hungry. Nevertheless, she was wary. Daylight found her "Not at home", but the night, as it does all the eerie wild things of Nature, drew her out and around and around the box. I found her glistening tracks, made by a glutinous fluid to protect her fragile body, and traced them in a criss-cross of fascinating pattern.

But her food worried us. Of snail fare we were ignorant. By experimenting, however, we found her favorite dish. We put bits of apple, orange, carrot, lettuce and cabbage into the box and invited her to the cafeteria. She declined abruptly and indignantly, but morning found the tell-tale tracks all over the lunch counter. The carrot had been disdained, the apple sampled and cabbage likewise, but the lettuce had been eagerly devoured. Perverse woman!

From then on it was but a matter of time before Nailie became entirely accustomed to our voices, our faces, and our motions. She gave up popping into her shell in a rage, or pulling in her head haughtily when we moved the box. True, she did until the day of her death pull in one tentacle and point the other at us admonishingly if we annoyed her, but on the whole she became inured to



the life about her. We found her a delicate, gentle, little creature, a real personality, with decided intelligence, tastes, curiosity and insatiable appetite. She had the tiniest set of teeth ever one saw and her bites, for her, were enormous.

She swallowed her food upwards, rather than downwards, and this habit we deemed most curious. Through the transparency of her skin we could trace the lettuce from mouth to forehead, up over the head and into the nether regions back and beyond. Water she sipped daintily as it clung jewel-like to the moss.

My very greatest delight in the little snail was her trust and recognition of me from anyone else. I could handle and caress her and not a movement would she make, save to wave her tentacles sociably to and fro or explore my hand. But should anyone else pick her up—slam went the door!

So for over two happy years Nailie waxed and grew fat. They were uneventful years, save when once she es-

caped and I found her all wizened up on a curtain, dusty, weary, and her supply of protective fluid quite gone, or when the house needed redecorating and she moved during the installation of new moss, or when the house itself rotted altogether and she got a new one. Nor did she hibernate. The seasons found her very much alive and on the go.

Then on one morning, *the morning*, came the climax of her life. We found, piled in a corner, a little heap of pearls. They were Nailie's gift to us and to posterity. In due time, each pearl gave forth a tiniest snail, perfect and complete.

They cruised about the box for days and then, I know not why, one by one they died. Their little shells lay silently here and there like empty cradles. Their mother followed them soon after. She crept into a corner and stayed there, never to come out.

I kept her shell for a long, long time 'til it crumbled to a skeleton. But even that turned to dust and is gone.



AMID THE RIPPLES

By Toshio Asaeda. This brought \$500 to the taker. At the right is Jack I. Pullen's picture, which took second prize in the Nature study class.

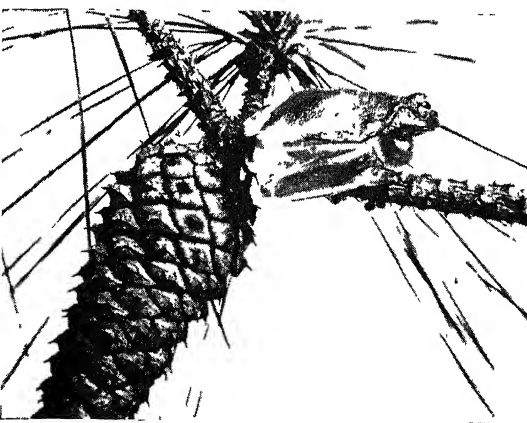
TOSHIO ASAEDA of New York City and Jack I. Pullen of Houston, Texas were the first and second prize winners in the Nature classification of the national amateur photographic contest recently conducted by the Eastman Kodak Company. Mr. Asaeda's subjects were the two geese, seen at the left, while Mr.

THE NATION'S BEST PHOTOGRAPHS

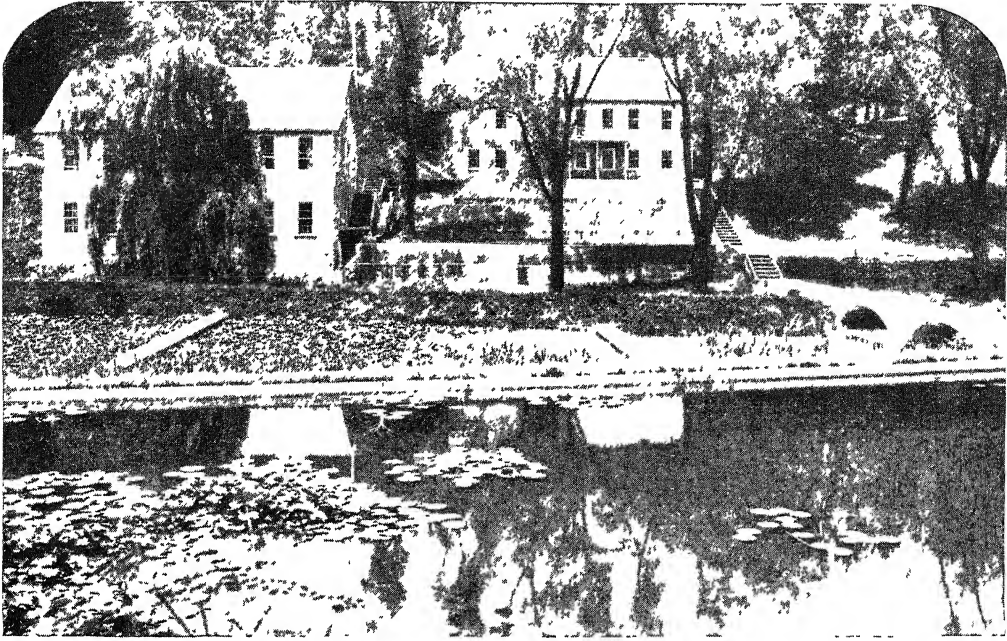
Nature Winners in Eastman Competition

Pullen chose the tree-frog, and collected \$250, half as much as the first prize.

These were just the chosen two from a large field, and the judges must have had great difficulty in arriving at



a decision. The contest proved beyond doubt that hundreds of amateur photographers can equal professionals, and that Nature is "shot" as often as portrait, scenic or interior subjects. The grand prize winner was Lawrence L. Martin of New Orleans, who was given \$2500 for his picture of Rosemary Martin, a daughter. More than three quarters of a million others competed. America is very camera-minded, and is becoming Nature-minded as well.



THE GOVERNMENT TURNS WATER FARMER
*A general view of the Wytheville, Va., trout hatchery, nursery and
 bass ponds. Future years will see many more of these.*

Tilling Watered Acres

A New Type of Farmer Grows to Prominence

by Lewis Radcliffe

United States Bureau of Fisheries

IN THE springtime, while the urban dwellers' thoughts lightly turn to gardens or golf, the land farmer plans his crops and the water farmer eagerly devours the latest scientific papers dealing with the comparatively new science of aquaculture. He is in search of helpful suggestions to overcome the many difficulties which confront him in his efforts to make his water areas as productive as the same acreage of tillable land.

Water farmers?—you ask with arched eyebrows. Yes, there are numbers of them and you will be surprised at the rapid progress which has been made in this new field, and the eagerness with which it has been taken up. And if you will delve deep enough you may become enthusiastic over the possibilities of this science contributing materially to our annual food supply.

As a matter of fact, in the Orient the growing of fish for market on an extensive scale is an ancient industry. The writer spent a fortnight twenty years ago in and around Manila, P. I., during the typhoon season during which no sea fish could be gotten. Yet day after day he found the fish stalls in the great markets of the city piled high with a bright silvery fish—the milkfish,—reared in ponds close by. Without these fine fellows harvested from the tidal ponds, meat proteins would have been at such a premium that only a small percent-

age of the better class would have been able to satisfy their wants.

In the springtime you may discover individual fishermen armed with a small triangular cheesecloth net busily seining certain sandy beaches for the tiny milkfish but a few days old. The tiny fish are placed in earthenware pots and transported by swift sailing boats to the ponds. In some of the provinces the right to fish for the tiny fry is let to the highest bidder, one province deriving from \$25,000 to \$50,000 from this source alone. Under an intensive system of cultivating the vegetation upon which the milkfish feed, with the transferring of the fish to new ponds when the vegetation is no longer sufficient to keep them growing rapidly, these fishes grow to a marketable size by late autumn. In fact these rapidly-growing fishes may reach a length of twelve inches in four or five months after planting; sixteen inches in seven or eight months and eighteen inches before a year has passed.

The pond areas around Manila are valued at more than \$10,000,000 and the annual harvest brings in more than \$3,000,000. Among a people who depend so largely upon fish, pond culture is of great economic importance. The milkfish is also grown extensively in Formosa and Java. In the Hawaiian Islands are the celebrated mullet



THE FAIRPORT, IOWA STATION

One of the Bureau of Fisheries experimental laboratories, where it is proving the worth of tillable water acres

ponds, the time of building of some of which dates back into the age of fable. According to tradition, one of the ponds was built more than two hundred and seventy-five years ago and the natives engaged in its construction formed a line from the shore to the mountain and passed the lava rock from hand to hand till it reached the site of the pond without once touching the ground in transit. The ponds are formed principally in the bays indenting the shores of the islands, and are commonly constructed by walling off a section of the bay with lava rock. In 1900, these ponds embraced several thousand acres, valued at more than \$165,000, yielding a harvest of 680,000 pounds. At the present time there are fifty-six ponds still in operation covering nearly twenty-five hundred acres and producing 150,000 pounds of mullet, which sells for an average price of thirty-five cents per pound.

In southeastern China, Dr A. W. Herre advises the writer, there are innumerable thousands of fish ponds, chiefly devoted to growing carp. Many of these ponds are little more than puddles. In this region carp culture is the complement of silkworm culture, the land being devoted alternately to fish ponds and mulberry plantations. After about eight years, the pond is filled and used as a mulberry plantation, the excavated area being used as a fish pond. The sediment deposited in the bottom of the pond is cleaned out each year and spread over the fields as fertilizer. This method of farming has been in vogue for centuries. In handling the ponds, sound practice is intermingled with many superstitious observances and absurd customs. Some of the fast-growing species

of carp are so highly appreciated that there is a considerable export trade of the young to Formosa, Singapore, the federated Malay states, and to other parts of China for stocking purposes.

Fresh water pond culture is also practiced in Java, the best and most important fish being the gurami. This species builds nests in which to lay the eggs. Careful breeders, Doctor Herre writes me, place nests in shallow

waters near the edge of the pond for the use of the gurami. When discovered, the eggs are removed and placed in a large wide earthenware pot of water which is placed in the pond to float in the shade. The newly-hatched fry are held in these pots for about two weeks and then transferred to a small, specially-prepared pond and held for two or three months before transferring them to the large growing ponds. The people owning gurami ponds are the wealthiest and most progressive people of their neighborhoods, and the fish ponds' areas bring the highest real estate prices of the region. The gurami of Java and some of the fast growing carps of southeastern China merit the attention of aquiculturists in other parts of the world.



MASTER OF AN OLD SCIENCE

Here is a Filipino with his net for catching milkfish fry, one of the products of an old industry

Aquiculture has reached an unusually high state of perfection in Japan. No less than one hundred thousand establishments are engaged in the practice in public waters, and the areas under cultivation amount to some 165,000 acres, yielding products to the value of \$9,000,000 annually. Carp, trout, eels, mullet, turtles, oysters, mussels, and other species are raised. The number of establishments carrying on water farming in privately-owned waters also exceeds one hundred thousand.

Carp, grown in rice fields, ponds, lakes, and marshes, and eels, salmon, mullet and goldfish, are the principal yields. Privately-owned waters used for aquicultural pursuits exceed 36,000 acres and the annual harvest is valued at more than \$3,000,000, making the total value of aquicultural crops \$12,000,000 a year.

While water farming in many Oriental countries yields a very considerable crop, the methods, excepting in Japan, are for the most part empirical, handed down from one generation to the next, and the fundamental principles underlying their success are but little known. Their practices are therefore of little significance to the embryo water farmer who wishes to embark in this field. The entrant into this new field wants to know what to do, why he should follow a particular course of action, what difficulties are to be avoided, and, in fact, the things he should do to obtain a yield as great or greater than from an equal land area.

It is true that fish culture as practiced on a huge scale by federal and state agencies is a phase of aquiculture. In the past, chief interest in this field has centered in the mechanics of operation,—in hatching out an ever increasing number of billions of fry and planting them as speedily as possible, trusting that a sufficient number would survive and grow to maturity to justify the expenditures. Within the last decade, in particular, workers here and there have become dissatisfied with such methods and have begun to delve deeper to ascertain the results achieved under the present system and to readjust practices to yield a much greater return

of adult fish. They plan a sort of intensive cultivation.

Such men as C. O. Hayford in New Jersey, N. R. Buller in Pennsylvania, John W. Titcomb in Connecticut, and Dr. G. C. Embury at Cornell have become critical of former practices and have initiated investigations to help solve the problems with which they were

confronted. Under the fostering guidance of Commissioner Henry O'Malley, the U. S. Bureau of Fisheries has rapidly expanded its program of research, not only in the field of fish culture but in other branches of aquiculture such as oyster farming, terrapin culture, the development of a program of fresh water mussel farming and the scientific management of water areas such as those in the Mississippi Wild Life and Fish Refuge area along the upper Mississippi River.

The Bureau's Pittsford, Vermont, hatchery is devoted to the problems of trout culture,—such as feeds, selective breeding, study of diseases

At the Fairport, Iowa, Biological station, similar experiments are being made with warm water species—bass, bluegill and crappie. Here carefully planned studies in pond fertilization, in the introduction of forage fishes for the basses to feed on, and the growing of plankton, and in other fields are steadily raising the productivity of water areas to a point scarcely dreamed of a few years ago.

On the Atlantic and Pacific coasts a staff of highly trained scientific workers are directly aiding the oyster

WHEN Lewis Radcliffe, the author of this article, writes on fishes, he writes as an expert and an authority. Ever since he graduated from Cornell in 1905, his reputation in this field has been growing. He was a member of the famous Albatross expedition to the Philippines in 1907, Director of the U. S. Fisheries station at Beaufort, N. C., a Chief of the Division of Fisheries Industries in the Bureau of Fisheries, and is now Deputy Commissioner. He has made studies of fish-life in Chesapeake Bay which have proved invaluable in conservation work there. In recent years, he has given particular attention to the development of oyster farming and aquiculture, and is foremost in the development of these newer fields.

WHERE THE GAME BASS GROWS

At this Orangeburg, S. C., water farm, many a fisherman's catch grows to maturity, later to be placed in ponds.



farmers to overcome their difficulties and increase their yields and are mapping out a program whereby the state authorities may properly maintain the natural supply.

At the Beaufort, N. C., biological station the practicability of growing the diamond back terrapin—the delight of the epicure—has been advanced to the stage of consideration by the water farmer, and in cooperation with the North Carolina state authorities, thousands of young terrapins are being reared for stocking the waters of the state.

These activities illustrate the measure of attention aquaculture is receiving from the U. S. Bureau of Fisheries, and are developing so rapidly that it is most difficult to find college graduates with the necessary basic training for conducting investigations in this field. The few universities that specialize in this branch have little difficulty in placing their men in positions where they may continue their scientific studies.

In practice we find many lines of water farming. Perhaps the most highly developed is that of oyster farming, centering in the Long Island Sound region where cultivated areas have largely supplanted natural grounds. This is also true of points on the coast of Washington, Olympia oysters being famous on the west coast. With the development of oyster farming to an exact science, we may expect that it will largely supplant natural producing areas and supply an annual harvest several times greater than the present yield. Already some attention is being given to the practicability of clam culture and the growing of scallops.

The raising of goldfish is an important industry in the United States, goldfish farms exist today in Maryland, West Virginia, New Jersey, Indiana and California. Trout farming is still another phase of aquaculture. The demand for the eggs for stocking public and private waters is sufficient to attract considerable investment in the venture, annual sales of trout eggs being estimated at about \$200,000 annually. In addition, surplus fish are sold for food at fancy prices.

Many other illustrations will come to the mind of the reader such as muskrat farming, growing fish in farm ponds and probably frog farming. Of the last mentioned, not infrequently the principal source of revenue has

been the passing along of the alleged secrets of success for a consideration. It appears that even in this field one may develop means of supplementing natural conditions so as to increase the productivity of a given area. Recent exports of several thousand adult bullfrogs to Japan for breeding purposes reveal the interest of the Japanese in the possibilities of frog farming in a land where, like our own, frog legs are listed with other epicurean delicacies.

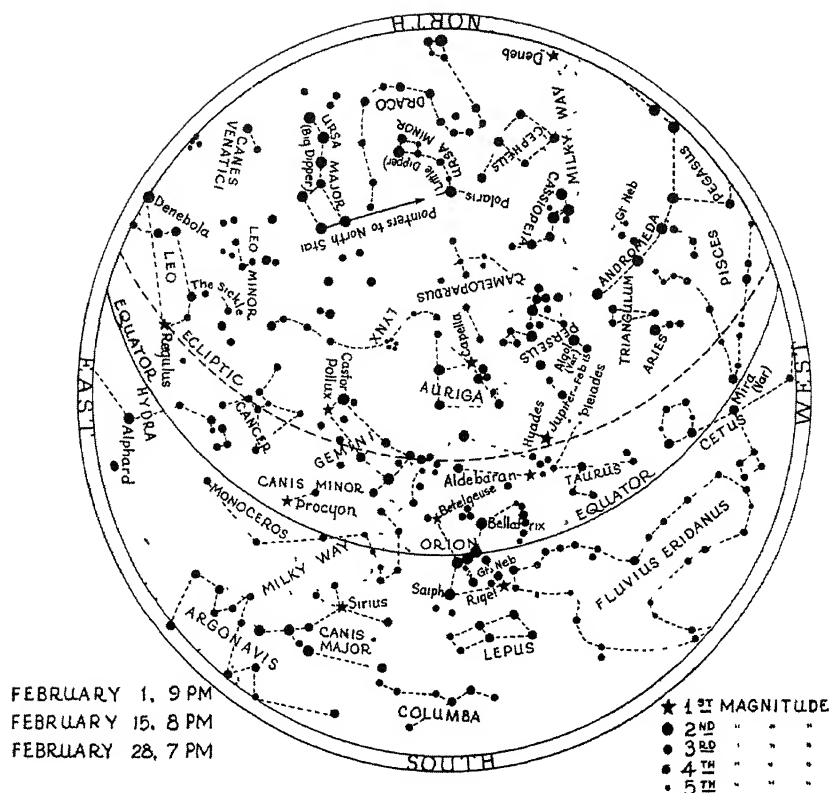
Naturally one of the first questions that will come to the mind of the embryo water farmer will be a comparison of the productivity of land and water areas of the same size. There is considerable evidence at hand that water areas will produce more food than the same acreage of tillable land, and that, as this new science advances, we may obtain an annual harvest far greater than any similar land area can produce. As a result of considerable study, Dr. G. C. Embury of Cornell University concludes that our richest trout streams should produce three hundred pounds of trout flesh per acre and our poorest streams about seventy-five pounds. He cites the case of an eastern private trout stream, having a width of about fifteen feet, very rich in food, and heavily stocked, which has yielded from about five hundred to seven hundred legal sized trout per mile per annum.

At the Bureau's Fairport station, where experimental investigations are being conducted under the direction of Dr. H. S. Davis, one of its ponds produced the equivalent of 272 pounds of bluegill sunfish per acre in one summer, and another 450 pounds of goldfish, and the maximum production of 3-inch bass in a season has been raised from 6,200 to 11,500 per acre. At the present time the huge acreage of oyster bottoms along our Atlantic seaboard yield one hundred pounds of oyster meats per acre annually. Under a proper system of intensive oyster farming it is conceivable that we may easily double or treble the production per unit area.

These are but glimpses into this newer science of aquaculture. In the course of its development there will be many failures, many difficulties to overcome, but with their solution we shall in time fix more definitely the productivity of water areas and the place of aquaculture in supplementing our meat protein supply.

In previous issues of NATURE MAGAZINE Edward A. Preble has written notable articles on fur-bearing animals and on hawks from the conservation point of view. These were reprinted as booklets and have been widely used in educational work. A few of these booklets, incidentally, are still available in lots of ten or more at a cost price of five cents each. They are illustrated in color.

In the March issue Mr. Preble will add to these two significant articles a third on the owls of the United States, their importance as subjects of legend and folklore, their life habits and, in many instances, their economic value.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

u the CELESTIAL SCENERY SHIFTS

Constellations Slowly Change in Form as the Stars Move Onward

by Isabel M. Lewis

CENTURIES ago, when man first began to study the stars, he grouped them into fanciful forms of animals or objects familiar to him. He pictured, upon the inverted dome of the night sky, serpents and dragons, lions and dogs, heroes and maidens; crowns and harps and triangles, a sky-river, a fabled ship and strange creatures of the sea, a sea-goat, a dolphin and a whale, tracing their more or less crude outlines with the aid of the brighter stars. On through the centuries man has added to these celestial forms and filled in gaps that existed in celestial regions of the southern hemisphere, less widely known, with such forms as a crane, a peacock, a gold-fish and a flying-fish, bearing little if any resemblance to the creatures for which

they were named, until now all the stars in the heavens lie within the boundaries of one or another of ninety different constellations.

With a few exceptions, due to the more rapidly-moving stars, the constellations appear today to unaided vision in the same relative positions that they did five thousand years ago. With respect to other constellations and in their individual forms they are practically unchanged.

The Precession of the Equinoxes, which is the slow westward shift of the points of intersection of celestial equator and ecliptic, has produced a slow conical revolution of the north pole of the heavens around the north pole of the ecliptic in a period of 26,000 years. This has brought about great changes in the appearance of the

heavens in any one latitude in the course of centuries though it has left the relative positions of the stars and constellations unchanged

Five thousand or six thousand years ago Alpha Draconis was the pole-star and The Southern Cross was visible in the latitude of London. In the year 8,000 A. D. Alpha Cephei will be the North Star, and in 14,000 A. D., the magnificent Vega will have that position. Once more, 26,000 years from now, Polaris will take its place as the Pole-star. During this period of 26,000 years in which the north pole is completing one revolution around the north pole of the ecliptic, the vernal equinox will have backed completely around the heavens through the zodiacal constellations and returned to its present position in Pisces. The sun will have appeared in turn in each one of the zodiacal constellations at the beginning of spring. This will bring into view for centuries at a time constellations that are now always below the southern horizon and will completely change the appearance of the circumpolar heavens as well, although the form of the constellations will remain unchanged for several thousand years to come. Precession shifts the celestial scenery as a whole in any one latitude without changing necessarily the appearance of the various actors, the constellations.

This conical motion of the earth's axis about a fixed line directed toward the pole of the ecliptic and the westward shift of the points of intersection of equator and ecliptic, known as the equinoxes, are due to the fact that the earth is not a perfect sphere but has an equatorial bulge which the gravitational attraction of sun and moon, working together, tends to draw into the plane of the ecliptic. The behavior of the earth's axis of rotation, as a result of this attraction, is very similar to that of a spinning top. The force which tends to change the direction of the rotating body produces a motion at right angles to its own direction and a conical motion of the axis of rotation is the result.

Although the Precession of the Equinoxes does not alter the positions of the constellations with respect to one another nor change the form of the individual groups, it is true that the forms of the constellations are slowly but surely changing. Every star in the universe is in motion. There are two components of a star's motion that astronomers measure, one the "proper motion" of the star, that is its motion *across* the line of sight, and the other the radial velocity or motion *in* the line of sight toward or away from the observer. This is determined for stars of sufficient brightness by observing and measuring the shift in the lines of the spectrum of the star. When these two components of the star's motion are known its actual motion through space relative to the earth can be determined. The sun, also, as one of the stars, is moving onward through space in the general direction of the bright star Vega at the rate of twelve and a half miles a second. In the course of centuries, slow as these motions are compared with the enormous distances that the stars travel, they are bound to be reflected in the positions of the stars relative to one another and therefore in the form of the constellations. Sooner or later the fanciful forms that star-gazers of the distant past pictured in the sky will fade away and others will take their place. Our Big Dipper will lose its characteristic form in less than

fifty thousand years and will need to be renamed. Five of its stars belong to a great moving cluster of stars known as the Ursa Major group and they are moving in parallel directions through space, but the other two stars, the one at the end of the handle and the more northerly of the two stars known as The Pointers, are moving in other directions and the effect will be to destroy eventually the form of this historic configuration.

That beautiful little group known as Corona Borealis, The Northern Crown, is also doomed to lose its distinctive form in twenty thousand years or less. Scorpio, one of the most striking groups in the sky, belongs to a great group of stars known as the Scorpio-Centaurus group. Some of the brightest stars are members of this group, including Spica and Beta Centauri, as well as Antares and stars in the Southern Cross. Its stars are comparatively far away and their individual motions across the sky in a century are very small. But in fifty thousand years the tail of the Scorpion will be no longer recognizable.

The great constellation of Orion is formed of stars that, with the exception of ruddy Betelgeuze, belong to an enormous cluster that is at a distance of over six hundred light years from the earth. This group is moving directly away from the solar system so that the motions of the individual stars are very small, and, as a result, the form of the huge sky-warrior will remain unchanged long after nearer groups have lost their distinctive forms.

For the next five thousand years or so few changes will be noted in the forms of the constellations. Then, gradually, the effects of the motion of the stars and the sun through space will become increasingly apparent, and the astronomers of far distant ages will undertake the task of mapping out new constellations with new boundaries in the heavens above and will bestow upon them strange names, including, possibly, the names of objects unknown to the present age.

Jupiter is now a fine object in the evening sky in Taurus. On February 26 it will be on the meridian due south at sunset. Venus will not be visible this month as it comes into superior conjunction with the sun on the sixth of the month. It will next be visible low in the west in the evening twilight. Mercury will be at its greatest elongation west of the sun on February 15, and may be seen for a week or so before and after this date in the southeast just before sunrise. Mars is now in Capricornus and still too close to the sun to be seen. It is far from the earth and no brighter than a star of second magnitude. Saturn is in Sagittarius and is visible in the southeastern sky before sunrise.

This is a particularly good time to observe the magnificent constellation of Orion, considered to be the finest constellation in the heavens. To the northeast of Orion is Canis Minor which contains the Little Dog-star, Procyon.

Castor and Pollux in the constellation of Gemini are now high in the eastern sky and northwest of Gemini and north of Orion are Capella, the She-goat, and her three Kids in a little group to the southwest, which Auriga, the Charioteer, holds in his arms. The Milky Way is particularly beautiful at this time of year arching high across the heavens from Gemini through Auriga to Perseus and Cassiopeia.

SCIENTISTS agree that a long way back birds and reptiles were closely placed branches on Nature's family tree. Nowadays, however, one rarely thinks "snake" in connection with a bird, especially if it be one of the soft-plumaged, sweet-voiced, small and inoffensive kinds with which we are most familiar. Occasionally one may get a glimpse of the unblinking bead-like eye of a bird brooding in some dark shelter, that gives a distinctly "snaky" impression, and it must be recorded that there is enough suggestiveness of snakes about birds so that for one reason or another quite a large number of them have been named "Snake Birds."

The European wry-neck is one that goes the limit in snakiness. Having as it sits in its nesting cavity the fixed stare previously alluded to, it indulges also in tortuous movements of the neck which account for the name wry-neck mostly used in books,—and it hisses. These features combined have firmly convinced lay observers that it should be called snake-bird, and such is its cognomen in the English country-side.

In America we also have a bird whose generous length of neck, and the movements thereof have given it the name of snake-bird. This is the Anhinga or darter of books and as one sees it in southern cypress-swamps often protruding only its head and long neck above the surface of the water one re-christens it with the popular, and fails to recall the book, name.

The cypress-swamp snake-bird really has some bodily resemblance to a serpent to justify its nickname, but one of our small land birds gets the name solely from its appearance in motion. This is the lark sparrow

SNAKE BIRDS

Throwbacks to a Reptilian Heritage

by W. L. McAtee

ance or actions to suggest the snake, while we have another that is dubbed snake-bird or snake-skin bird because of its taste in interior decorating. The great crested flycatcher has the peculiar habit of always

which in Utah is known as snake-bird from its running through the grass "like a streak". The name, could, with equal reason, be applied to a variety of small ground birds, including several kinds of sparrows.

The birds so far mentioned agree in having something in their appear-

ance or actions to suggest the snake, while we have another that is dubbed snake-bird or snake-skin bird because of its taste in interior decorating. The great crested flycatcher has the peculiar habit of always draping one or more partial or even entire shed skins of snakes over its nest. The nest is invariably in a cavity where visibility is poor so that a reason for the snake-skin decoration is difficult to surmise.

A number of groups of birds throughout the world have been given the title of snake-birds because they eat snakes. A whole group of tropical hawks go by the vernacular name of snake hawks or snake buzzards, and the former name has been applied to our beautiful and graceful, but now regrettably rare swallow-tailed kite. The snake crane, alias the crested screamer, of Brazil also gets its reptilian appellation from its fondness for snakes as food. The well-known secretary-bird of Africa is called snake-eater or snake-bird, and our curious road-runner, a kind of cuckoo which lives on the ground and can keep pace with a running horse

for a short distance, has among its long list of local names that of snake-killer.

Of all the reasons, however, for calling birds snake-birds, the most remarkable is that of the old negro mammy in Virginia, who so called the catbird, "coz he chases de snakes away." And perhaps the creature does.



AFRICA'S SECRETARY BIRD

Like our roadrunner, he is associated by name with reptiles having the title of snake bird

THE DECOY

Out in a field near Owensboro, Kentucky, stands this grotesque caricature of a bird or water fowl on the nest. Even the eye seems to be in place, for a hole letting through daylight, well imitates the sight organ of some bird. The object is nothing but an old stump, worn with age, but so realistic is it that many people are completely fooled when seeing it from



An Old Stump Imitates A Bird

a distance. Henry S. Barton, who sent the photograph, does not reveal, however, whether hunters pop at it by mistake, or hide by it to watch for other birds who are decoyed by this queer object. In any event, before many years pass, it may, provided the weather does not destroy it, stand as a monument for departed legions who no longer roam the land.

A RARE PLANT FROM THE FAR EAST

The Sacred Lily Of India

by Pearl K. Leonard



SUMMER AND WINTER

The bulb at the left in the lawn in summer and at the right it grows from the bulb with no earth or water

THE SACRED Lily of India, *Amorphophallus* *ivveri*, has its appeal for gardener, botanist, and Nature lover. It is a newly-introduced bulbous plant, until very recently not readily procurable, blooming in the house in February from a dry bulb.

The bulb, the blooming size of which must be at least four years old, is necessarily large, for the magnificent flower which grows from it—without earth or moisture—is usually seven feet or more tall. The blossom itself is three feet long, a combination of deep maroons and reds, borne on a slender green stem which is mottled with white. It is extremely difficult to convey to minds that usually think in terms of relatively small flowers the stateliness and elegance of this bloom. Can you imagine a giant red calla lily, with the spadix lengthened and broadened to immense proportions, rearing itself higher than a man's head? If you can, you have an idea of what the Sacred Lily is.

The most astonishing feature of this bloom is that all the bulb requires is a little warmth. Absolutely no earth or water is needed to aid its flowering, and a bulb four or more years old will bloom every year. When the flower stem starts in February, the growth is amazingly rapid, sometimes increasing as much as four to six inches in a single day, and attaining its maximum growth

after about thirty days.

Of course, the bulb cannot bloom year after year without renewing its energies, so in late April or May it should be planted in the yard or garden. All the care it requires is a little loosening of the earth about it, and to be kept moist in dry weather.

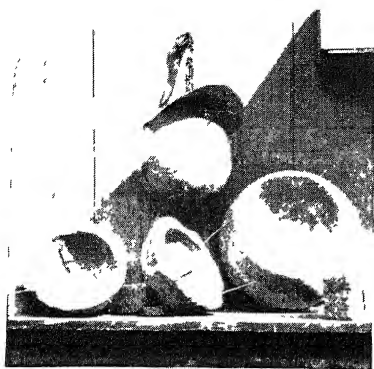
The plant of the Sacred Lily in the summer is very attractive, growing about four or five feet tall from a blooming size bulb, and reaching its full growth in about a month after planting. Its stem is slim and straight, green mottled with white, and crowned with a spreading palm-like arrangement of branches, the leaves of which are small, green, and edged with a dainty lacy effect. If the bulb produced no flower at all, the plant would be enough to warrant its keep, for its graceful, exotic foliage lends a foreign touch to any garden that is decidedly fascinating.

After the first hard frost the plant will dry and wither and the bulb must be taken up before freezing weather. When the bulbs are dug, offshoots may be found. These should be planted the next spring for additional bulbs. Young bulbs will produce foliage each year, but will not bloom until the fourth year.

The Sacred Lily is such a rarity and so unusual that it never fails to attract attention. When its ability to bloom without food or drink and its beauty and size are considered, it is not difficult to credit the report that the natives of India worship it. This belief is widespread and apparently well founded enough to give authenticity to its name, "Sacred Lily of India," although it appears occasionally under such colloquial names as "Devil's Tongue," "Snake Lily," and "Giant African Lily."

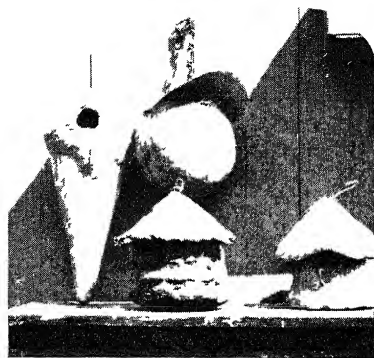


Among the many interesting features scheduled for use in the March issue of *Nature Magazine* is a notable story on the *Rain Quail* of India. Dan MacCowan writes entertainingly of the amusing and prankish pack rat. Hawaiian birds, some beautiful snakes, trees, Spanish moss and some diseases of garden plants provide the subject matter of other excellent articles for March. The charm and beauties of Jasper National Park, Canada, will be the subject of a special feature.



HOMES IN CEMENT

by David T. Marshall



"BUILD FOR PERMANENCE"
This is the slogan of many a realtor, and the same axiom can be applied with ease to avian homes made of cement. Nor will there be any difficulty in renting—birds, like humans, flock to the latest developments.

For those not wearing a masons' union button, the task of working in such a medium may seem too difficult, but after an apprenticeship which consists of reading these directions, full mastery of the art is obtained.

Form a ball of clay, or mixture of clay and sand, about six inches in diameter, then hollow out a hemispherical depression in the earth or in a box of moist sand about eight inches in diameter. Fill the depression with a mixture of two parts sand and one of cement with enough water to make a stiff mush. The ball of clay goes in the center of the cement and is depressed until it is within an inch of the bottom. A small pebble will serve to prevent the ball from sinking to the bottom. Once the core is in place, the cement is built up around it, with moist sand packed close to give support. A big cork is placed in the top, to become the entrance hole in the model home, and a stout wire, sunk in the cement, forms the hanger. Some non-rusting wire is advisable, as rust will discolor the home, ruining its appearance.



The clay core can be softened in water, and cleaned out with a wire when the structure is hard. It may be advisable to make a visor of cement or of galvanized iron to fasten above the hole. The product may be painted with a mixture of water, paint and cement to give the desired effect.

If a number of houses are to be built, a cement mould, hemispherical in shape, can be made. This serves to form each half of the house, and wires, placed in the cement, will fasten the two halves together.

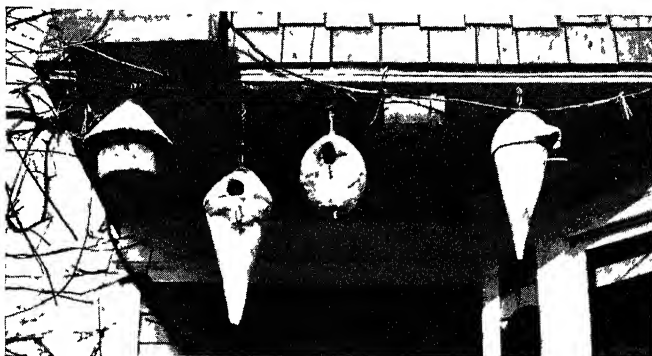
Anything that will give even temporary support to cement may serve as a form,—tin pails, wooden boxes, and even a roller bandage of burlap.

Piling sand against the hardening product gives a rough surface which is very desirable and artistic.

Among the many cores that may be used, one of the easiest to remove is twine. Wind a ball of it around a stick somewhat longer in length than the house is to be wide.

When the cement is dry, it is necessary only to pull out the stick and the void will act as an entrance. It is advisable to wrap several layers of paper around the stick, as otherwise the cord may stick when wet.

Simple, is it not? But watch out the building trades do not get after you. You're breaking all the rules.



This is the time of year to be thinking about what provisions you are going to make for bird visitors in the spring and planning the sort of habitations you are to provide for them during the nesting season. Bird houses are not haphazard things but should be considered with care and a view to the sort of birds you wish to attract. Excellent, scientifically designed bird houses are available from several manufacturers if you wish to save the trouble of building the homes yourself.

THINGS to THINK ABOUT

A Page Devoted to Conservation from Varying Angles

More About Roadsides

Reports from various fronts in the battle to reclaim and preserve our roadside beauties are constantly being received by the American Nature Association.

One of the most interesting developments is the inauguration of a demonstration state survey by the National Council for the Protection of Roadsides. This is the new name of the organization previously known as the National Committee for the Restriction of Outdoor Advertising, through which more than one hundred organizations joined to work in this common effort. The survey is being conducted by virtue of the support of the American Nature Association and is in the charge of Mrs. W. L. Lawton.

North Carolina has been selected as the state for the survey, particularly on account of the progressive attitude of the highway department of the State, which has been doing effective work in roadside planting and beautification. The survey will be thorough and cover the entire state. Each highway of importance will be covered, mile by mile, and extensively photographed. A complete consideration will be given to the various phases of North Carolina's particular problem and a full report with recommendations will be made and published as a part of the demonstration. At least two months will be devoted to the study.

Partial surveys have been made in New Jersey and in Virginia, to be more completely followed out later. The American Nature Association feels that the entire problem should be approached on a practical basis, and that whatever is proposed should be founded upon irrefutable facts carefully gathered and considered.

The article on California's billboard problem in Nature Magazine has brought some surprisingly interesting reactions and many letters of commendation from citizens who resent the desecration of the landscape by their beautiful state. A conference at Sacramento recently resulted in the adoption of a militant program. Action has been taken to band together property owners along the approaches to Yosemite National Park to remove all billboards on this approach. The City of Pasadena, recently adversely advertised by pictures of contiguous signboards, is aroused to action. The Hollywood Plaza Hotel, one of whose signs we showed in our article, write that they have stopped this sort of advertising but point out that the boards they used still stand—blank. The yeast of public sentiment is working.

Bag Limits on Mourning Doves

The plea is often made that no bird that lays but four eggs at a time ought to be on the game list, the group referred to being the shorebirds, including the avocet, godwits, curlews, plovers, snipe and woodcock, as well as the small sandpipers. This seems reasonable, but what shall one



PUBLIC OPINION EXPRESSES ITSELF
A few of the newspaper clippings about the billboard problem surround Mrs. Lawton, who is in charge of the demonstration survey in the South

say of the pigeons and doves, that lay only two eggs? Yet a hunter may kill mourning doves, in most of the states that allow their shooting, to the number of twenty-five each day, being the product of twelve nests. A number of states, including Missouri, Nevada, Oklahoma, and Virginia, allow the sportsman to try to kill his limit each day for 106 days each fall. A few states are less liberal, allowing only fifteen or twenty birds each day of the open season, and Minnesota, one of the few northern states that permit this bird to be killed as game, allows only nine per day for a short season.

Is it any wonder that many thoughtful persons, even some sportsmen, predict for the mourning dove the fate of the extinct passenger pigeon? We do not agree with this view, for we believe that before this fate actually threatens, its outraged friends will demand the removal of this gentle, harmless species from the game list.

The truth is that in most of our states the bulk of the upland game species are so reduced that it is difficult to find anything sizable to shoot at, and the hunters hate to give up the dove.

Alaska Caribou Suffer

We note that under the game laws in force during the season 1929-1930, the killing of caribou in Alaska, north of the Arctic Circle, is permitted the year round. This seems to be a decided backward step, and one decidedly out of harmony with the custom in the neighboring provinces of Yukon and Northwest Territories, where the conditions are very similar, and where the tendency is to restrict, rather than extend seasons for killing big game species. In these provinces the killing of female caribou with young (in Yukon females at any time) is prohibited. Yet in northern Alaska anyone may now lawfully kill mother caribou with their helpless young throughout the summer.

It has long been customary to extend to natives and explorers in the remote parts of Alaska, as well as in the northern provinces of Canada, special hunting privileges, in recognition of the fact that they are largely dependent on game for subsistence. But the privilege just cited, open to everyone, seems scarcely justified by any reasonable considerations.



PLANTING THE GARDEN, MONTH BY MONTH

BY ROMAINE B. WARE

He who truly appreciates Nature's wonders and studies them through the medium of a flower garden, is keenly alive at this season. Seed catalogues, countless thousands of them, shout advance notices that the perennial crop of seeds is ready. The catalogues vie with each other in presenting novelties and new things and we plant mental gardens upon a grand scale. With seeds as a basis for mixing our pigments we vision garden pictures more perfect than ever before, because gardening is a creative art, one in which true individuality may be expressed. The opportunity is before us, the seeds will do their part if we will do ours, but we should not blame it to poor seeds if we neglect to supply the requisite conditions and care. A very large part of success with seeds depends upon one's knowledge of the fundamental rules.

Garden planting at this season of the year, except in the extreme south and upon the west coast, is largely confined to seeds that must be started indoors. A few weeks later hot-beds may be started and later still cold-frames can be planted. The starting of seeds indoors is comparatively simple if a few general practices, developed by countless thousands of home gardeners, are observed.

First, buy good seeds from reliable established seedsmen. They use every precaution to supply only the finest and freshest seeds. Go over the catalogues, several of them, compare, select and re-select with the greatest care. Include the old standbys together with some of the highly praised novelties. Start more plants than you expect to use. They always come in handy to fill blank spaces or to trade with a neighbor for things you do not have. Unless you need an extremely large number of plants of any one variety, a single packet of each is usually sufficient. Such things as petunia, verbena, vinca, pentstemon, lobelia and snapdragon should all be sown before the end of February. Some of them are very slow in germinating while others develop slowly and need many weeks to attain blooming size.

Planting seeds indoors necessitates careful attention to soil, containers, watering, sunlight and ventilation. Seeds will germinate in pure sand, but a mixture of sand and leaf mold, half and half, will give better results. When the seedlings have their first true leaves, transplant them into soil made by mixing and sifting through a quarter inch mesh sieve, sand, leaf mold and good garden loam, about equal quantities of each. No fertilizer is needed at this stage of their growth, but special attention must be given to proper drainage.

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White as winter's snows, a center of golden stamens, and a delicate fragrance, the blooms of *Franklinia* (*Gordonia*) are matchless in loveliness.

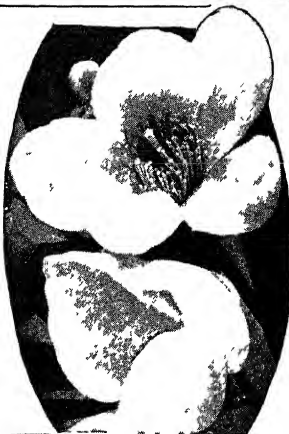
The flowers, about 3 inches across, open in mid-August and are produced continuously until frost. The tree is hardy, in protected situations, as far north as Boston, growing readily where rhododendrons thrive.

Extra heavy plants, 27 to 33 inches high, \$7.50 each. Splendid specimens, 18 to 24 in high, \$5 each, 10 plants for \$45.

Orders should be placed at once for spring shipping. Further description and details on request.

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You'll be interested in our new Bright pink Ruffled Petunia; Hardy Double Carnations in five colors; a new fragrant Sweet Pea; New Asters; New Zinnias; New Vegetables. We've printed the sort of seed book you've always wanted. Send for it to-day. It's FREE!

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Fancy Fish

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Pots may be used for seed germination, but boxes, called flats, about three inches deep are best for transplanting into and growing seedlings. A dozen or more half-inch holes should be bored in the bottom of each box to insure perfect drainage and a half-inch layer of ashes or gravel should be placed in each one before filling with the soil mixture. Poor drainage is fatal to seedlings.

Sow seeds thinly and cover in proportion to their size, very small ones merely pressed into the surface and larger ones covered an eighth to a quarter of an inch by sifting very light sandy soil over them. Very fine seed sows easier when mixed with dry sand and the mixture scattered over the surface. Seeds do not need light to germinate, merely moisture and mild heat, but just as soon as they are through the surface, light and ventilation are essential.

The containers of seeds must be watered carefully and regularly, if allowed to become dry during this critical time, many plants will be lost. One of the best ways to water without danger of washing the seed out is plunging the entire container into water nearly up to the rim and allowing absorption to moisten the soil. Another way is to wet a coarse cloth, lay it on the soil and pour the water gently upon it, removing it when the soil is thoroughly saturated. Still another method is to place a thin sheet of tissue paper over the soil, water with a very fine spray and it will readily pass through the paper which may be left in place and the little plants will come up right through it. The flats of transplanted seedlings must also be watered regularly and carefully, if once allowed to suffer from lack of water they may never fully recover. When watering, the soil should be thoroughly saturated, mere surface sprinkling is useless and harmful as it encourages root growth at the surface. The best method is to water thoroughly and then allow them to become almost but not quite dry. This encourages deep rooting,—just what is wanted.

Sunlight is, of course, essential to plant growth, especially seedlings. A south or east window is desirable though a bay window to the south is the best. Upon extremely cold nights some papers should be placed between the glass and the plants to save them from danger of a chill which might set them back. Just after transplanting they should be shaded from hot sunlight for a day or two, but they must have light and air. Ventilation,—that is, fresh air,—should be provided daily, but they should never be in a draft. All of these little things are simple, but they are important and the successful growing of seedlings depends upon them.

When the little seedlings are transplanted into the flats from the seed beds, they should be set from two to three inches apart depending upon whether you are going to leave them there till time to set them out in the garden or transplant them again later. They need more room if they are not to be transplanted. Most seedlings, when three or four inches tall, should be "pinched back", that is, the top should be pinched out. This causes the plant to branch out and become bushy and stocky rather than weak and spindling. Transplanting and pinching back make for good root systems and sturdy plants. In the flats they should be lightly cultivated or the

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soil will become packed and hard, excluding air so necessary to plant growth

Many experienced amateurs pot up their seedlings, but this is not necessary except with such things as poppies, mignonette, sweet sultan, nasturtiums and salpiglossis. Some of the above can only be grown this way and all of them will do better if potted. Most of these develop root systems that will not transplant in the usual way.

There is but one serious disease to be feared with seedlings and this is a fungus growth commonly called "damping off". Excess moisture and humidity encourage it and the growth is so quick that an entire flat may be destroyed in one night. Refrain from watering late in the day so that the soil surface may be practically dry. Sand as a medium for sowing seeds in has the advantage of drying out quickly and is not nearly as likely to harbor this disease. Of recent years science has developed a means to combat its ravages. Products known as "Uspulun", "Calogreen", "Semesan" or "Dipdust" may be purchased from seedhouses and applied either in the form of dust or as a liquid.

It is very important that seedlings be kept growing vigorously, if stunted by neglect, their tissues become hardened and frequently they never recover. Proper soil, regular watering, ventilation and sunlight are all vital to their growth. None of these things are difficult to provide, but most of the failures can be traced to the absence of one or the other.

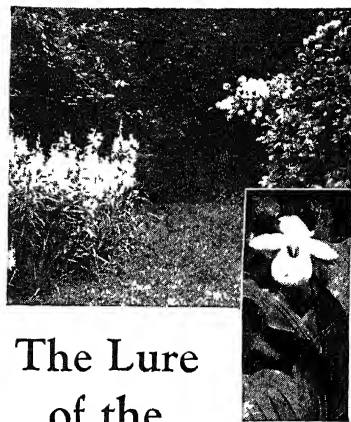
Except for the varieties mentioned in the beginning of these notes, most seeds should not be started too early. Fast growing varieties will get too far advanced before they may be planted outside. It pays however, to get your seeds on time, before the height of the spring rush. Plan the varieties you will plant and make a rough diagram of the planting plan. Mark each variety of seed with its name as planted and the date, so that you may know what to expect of them. The date will give you a check-up on the blooming time and may aid you in future years.

Use the greatest care that no gas escapes into the air of the room in which seedlings are grown. Even in extremely small quantities the effect upon plants is very harmful. With some things as little as one part in four hundred is fatal. The damage results from overstimulation. Daily ventilation is important but cannot prevent injury if gas is allowed to escape into the room.

The plants in our gardens which we have raised from seed have an especial value for us. We point to them with enviable pride, they give the garden an added feeling of ownership. Things bought from the florist may give as much bloom, but there is lacking that personal satisfaction of having produced them from seed yourself. The seed we plant, the flowers we raise ourselves, partake of the creative life, so abundant all around us, and we can all agree with Charles Warner, who wrote:

"There is life in the ground, it goes into the seeds, and also, when it is stirred up, goes into the man who stirs it."

DO NOT MISS
MR. WARE'S ADVICE
IN MARCH



The Lure of the Beyond

To those interested in wild plant life, "The Beyond" starts at the edge of the Woods—and coaxes! Amid shifting shadows and frolicking sunbeams, develop the most precious offspring of the native flora. This nursery specializes in plant materials for naturalistic gardens. Let's get acquainted through offers that follow.

Cypripedium spectabile The Showy Lady's Slipper

Does well in soil composed of leaf-mold or peat, and prefers moist, shady situations. This is the showiest of our native Orchids.

1 to 2 crown plants—3 for \$1 00, 10 for \$3 00
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A charming member of the Lily family, easily grown in moist situations.

Beautiful white flowers in early Spring
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Among the brightest and earliest of the Spring flowers, thriving equally well in sun or shade.

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Triloba is pink or dark purple. Blooms earlier than its western cousin.

Prices, either variety, 5 for \$1 00; 10 for \$1 50

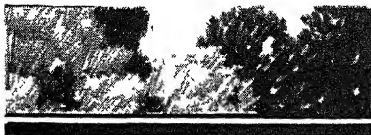
Mertensia (Virginia Blue Bell)

A great companion to Daffodil and Tulip plantings. Pink buds, blue and bluish white open flowers—a beautiful color combination for any situation.

5 for \$1 00; 10 for \$1 50

If you love Wild-flowers, Ferns and other plants for naturalistic gardening you will find *Our Catalog* the same source of inspiration which it is to thousands of Gillett customers throughout the country. Gladly mailed free on request and please mention this publication.

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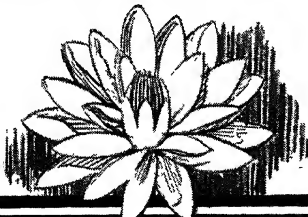
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T. R.'s Bird List

Mrs. L. W. Maynard of Washington, D. C., has long been active in local ornithological circles and was particularly so at the time Theodore Roosevelt was in the White House. His interest in birds is, of course, well known and Mrs. Maynard tells of one interesting evening at the White House when the late Richard Kearton was the guest of the President and was showing the first motion pictures of birds exhibited in this country. Later in the evening Mr. Roosevelt was talking birds to a group and Mrs. Maynard suggested to him that he make a list of the birds he had seen in the White House grounds for a new edition of the local bird book.

"I will do better than that for you," the President said. "I will make you a list of all the birds I remember to have seen in and around Washington." As he turned away he added, "You had better remind me about that list I may forget it. Send the reminder to Mrs. Roosevelt, then it won't get into the waste basket."

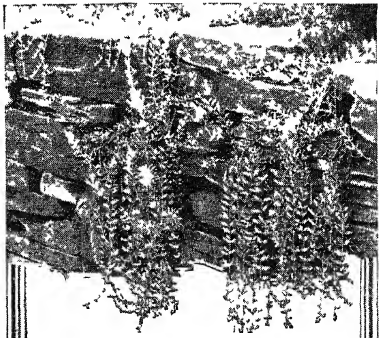
Mrs. Maynard sent a note of reminder the next day, and, within twenty-four hours, there came back a list of ninety-three species listed in Roosevelt's own characteristic handwriting. The list was printed in the book and separately. We have just discovered that Mrs. Maynard has some five hundred copies left of this separately-printed list. She tells us that she is willing to dispose of them for twenty-five cents each. Anyone interested in having this rather historic list should write to Mrs. L. W. Maynard, 1882 Columbia Road, Washington, D. C.

Louisiana Brds Increase

The "white wings of the sea"—the seabirds nesting in the wild life reserves along the Louisiana coast—are on the increase, according to Stanley C. Arthur, director of the wild life division of the Department of Conservation of Louisiana, who this summer made a survey of Breton and Chandeleur Sounds. In California Bay, Mr. Arthur and his associates found that the Louisiana herons, snowy egrets, little blue herons, black-crown night herons, and white-faced ibis were all present in greater numbers. The brown pelicans, emblem of Louisiana, were also more numerous, on their breeding grounds on the North Keys of Free Mason Island. Mr. Arthur discovered. The Department of Conservation banded hundreds of pelicans, terns, laughing gulls, skimmers and other sea birds on their trip, to determine their migratory range.

A Cat Trap

For those who are bothered by vagrant cats who prey upon the birds one has been seeking to attract around the home grounds, the U. S. Department of Agriculture has brought out a leaflet entitled *How to Make a Cat Trap*. This is Leaflet No. 50 and will be mailed on receipt of five cents in cash by the Superintendent of Public Documents, Washington, D. C.



Alpine Plants Will Give Charm to Rock-Gardens

Among the "Alpines," or rock-garden plants, you will find some of the loveliest specimens that Nature gives to gardeners. In the Independence collection are many rare kinds—varieties seldom found in ordinary groups. These unusual plants require no more care than common sorts, in hardness and habit they are equal to any of the varieties generally found in rock-gardens. Hardy Ferns bring the fragrance of the woodlands, dwarf Phlox give a touch of modern color, and Heather calls up visions of valleys and hill-sides. All these and many other Alpines are described in our 1930 catalogue.

Alpines for Rock-gardens

A booklet telling how to plan and plant the garden, select the plants, and care for them. We will gladly mail a copy on receipt of your name and address.

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A gem of the first water. Rich golden apricot blushed with salmon—as glorious as a June dawn. Pure without even the faintest trace of the usual center-lines to mar its beauty. It forms a stunning contrast and perfect complement especially to the purple varieties.
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Mail Robber

The days of the Wild West are not over, even though the stage coaches have passed and the pony rider express has given way to the airplane. Still the robberies of the U. S. mail, so marvelously played up at the 15-20-25¢ cinema palaces, have not gone out of fashion. The latest, according to the Yellowstone Nature Notes, took place in Yellowstone National Park, and a big black bear was the culprit. Dick White, a ranger, was carrying the mail to different road crews, and left it in the car while he lunched. When he returned, it was gone, and in a high nearby tree, a huge bruin was inspecting his prize. He turned it over and over, without paying any attention to shouts and blows upon the tree, finally, he dug into the centre of the bundle, and extracted a box. Opened, it proved to contain chocolates, which the bear slowly, with no apparent shame or fear, devoured one by one. After his feast, he examined the package for further delicacies, then reluctantly dropped it, and settled down in bored fashion for a rest until the indignant mailman, powerless to shoot the felon or to lock him up, went away.



Growing Narcissus

An unusual episode in flower growing was unearthed recently by W. E. Bowers of Selma, Alabama. A few years ago he planted some paperwhite narcissus in the yard, and a year or so later set out some nerine or spider lily bulbs in the same place. When digging in the garden, preparing the soil for annual flowers, he found the two bulbs attached to each other as pictured above. An offset shoot of the paperwhite bulb grew directly under a nerine bulb. Instead of growing around the nerine the paperwhite preferred to become a part of the former. There was no mark to indicate just where the union took place. The bulbs are now potted, and the results will be very interesting to watch.

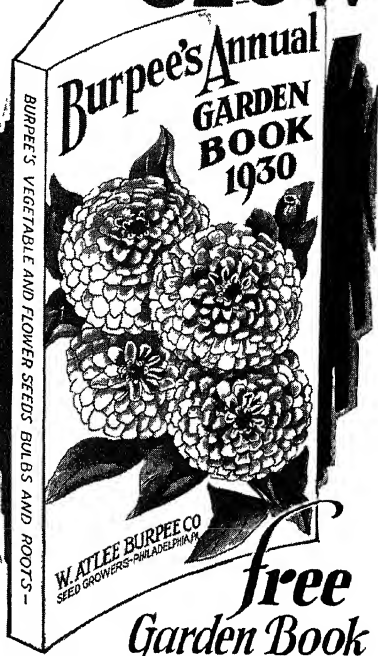
Sound Effects

The bears of Yosemite have long since become used to the movie camera. They love to gambol before it, and do their best, it seems, to act. The still camera, held by a visitor, is different, however, and so is the movietone. No one has been able to get them to "woof" for the Talkies. James V. Lloyd, naturalist ranger, reports, however, that when a little molasses was put on the microphone, three of the bears at the feeding platform uttered "lap-laps" that will be heard around the world.

Ohio Educators

A wide range of subjects, with a keynote of "reaching the individual," will feature the tenth annual Ohio State Educational Conference to be held in Columbus April 3 to 5. Among the speakers will be Robert M. Hutchins, president of the University of Chicago. A registration of more than five thousand is expected.

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Saving Columbus' Trees

When Columbus, Ohio was laid out, four rows of trees were planted along about a mile of Broad Street, and the home owners abutting on the street were proud of their elms. Two rows were in the middle of the street, making a central roadway carrying four cars abreast, and two bordered the curbs, along outside lanes about fifteen feet wide. But Broad Street, which runs through the centre of the town, became commercial, rather than residential, and the move was on to cut down these beautiful trees. The city council, under pressure, voted the removal of them, its action, however, was not final, for according to the city's charter, all ordinances must have the approval of a referendum. And the supporters of the trees won, by a few hundred votes last August, at the primary election. It is to be hoped that the matter is settled, now, once for all, or if it is again raised, that even a more signal victory will be won by the trees. Those who have seen the bareness of Pennsylvania and Connecticut Avenues in the Capital since the trees have been cut down and compared them to the tree-canopied New Hampshire and Massachusetts Avenues, will not wish to see Columbus, too, strip herself of her verdure.

Clever Coyotes

Just to prove that the human race has no monopoly on guile, two coyotes in Yellowstone Park performed a confidence game that would have done credit to O Henry. These two animals, reports Newell F. Joyner, Park Ranger, in the Yellowstone Nature Notes, chanced along the Yellowstone River at a time when a flock of ducks were reposing on its surface. They deliberately paraded along the bank, then, after being sure they were seen, went back into the sage. One circled around to a rock close to the river bank, and began waving his tail, which alone, of all his body, could be seen by the ducks, the other slowly sneaked back to the river bank. The ducks could not resist the temptation, they had to find out what it was all about. Closer they came to the waving tail, there was a gray flash, and two of the birds did not rise.

Brown Pelican on Coast

The brown pelican, for the first time in history, is breeding on the North Carolina Coast, T. Gilbert Pearson, president of the National Association of Audubon Societies reports. Nesting birds have been found on Royal Shoal Island in Pamlico Sound. Dr. Pearson states that the only other breeding places for the bird on the Atlantic coast are a small island in Bulls Bay, S. C., and one in Mosquito lagoon, near Titusville, Fla. Dr. Pearson some years ago was one of the men who prevented untold slaughter of these creatures by fishing interests that believed them destructive. He proved that their numbers were much less than supposed, and that their diet consisted largely of fish of no use commercially.

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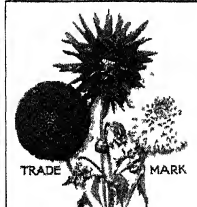
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Observing Ants

The antics of creatures infinitely smaller than ourselves are often much more interesting and amusing than those of human beings. Pauline Sandholdt, of Pomona, California, who is responsible for the following notes, seems to have found considerable to engage her attention when she made her attempt to find baby ants.

"One morning I watched the ants wake up and start about their business. There were three or four sleeping around the door of the hole and some farther away that had been out at the ringing of the ant curfew and had not striven to get home that night. Those who had slept out were covered with dew and looked like they were dead but were all up and going before noon. One thing about being a sick ant is that you don't lie around and do nothing for a day or two, you are licked back to life no matter how dead you look and after your sister thinks you are all right you are left alone until you are strong enough to go to work.

"One of the ants who slept at the door of the hole woke up and dragged two of her sisters, stuck together, around, apparently with the idea of waking them up. She had no success except that one got up and walked behind a small clod and went back to sleep again. About that time one of the guards in the nest below came to the top. She joined her sister above and together they hunted around for the other three. When they found one they would try to wake her up but success was slim.

"I touched one of the sleepers and it rolled right over the hole. Maybe it called that being a good guard but if it was in a human army it would be shot at sunrise.

"Soon a few more came up from below and walked around, then they went back. It wasn't long until they went about their daily business, only sleepily. They weren't up to par for several hours.

"In hopes of getting some baby ants in the different stages of ant babyhood I poured water down a hole of red ants. The water filled the hole with mud and packed a few ants in also.

"As soon as the water had soaked in the workers went to work clearing the passageway. At times a solid mass was working at the hole. Some ants walked over their sisters to get to the hole. These ants thoroughly spoiled my idea of all worker ants being hard workers. Some would take a load from the hole and bring it back and dump it right in the way of the other workers for no visible reason.

"When an ant excavated one of its sisters it would take it a long way from the hole and lick it back to life, then she would leave her sister to go back and work with the others. One ant carried a sister in a semicircle around the hole and then I lost them though I am sure she must have gone on farther. The licking operation takes only a second or two and appears to be to free the victim from the mud. Some of the ants go around coated with this mud.

"When the passage-way was clear one ant walked out on the ceiling, looked around and walked back the same way.

"A lady bug who appeared to have been in an auto accident, at least one hood was off, part of the engine wrecked and the rest badly tattered, went for an unexpected swim in the pond over the ant hole and I had to rescue her with the point of my pencil."

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Nature Poem Contest

More entries than ever before were made in the annual Nature Poem contest of the Chattanooga Writers' Club, which awards the Elberta Clark Walker Memorial prizes each year for the best Nature poem from contestants generally and for the best poem from a southern writer. The nationwide prize this year was won by Miss Clara Mae Barnes of Boise, Idaho, for her poem "To the Poet of the Wilderness." The prize to the southern poet went to Miss Beita Hart Nance of Albany, Texas, for her poem, "Carlsbad Cave." The 1930 contest will open May 1 and close November 1. Mrs. John H. Cantrell is in charge of awarding these prizes which were established by Robert Sparks Walker in memory of his wife.

Pony Prospecting

"Soapy" was only a pack-horse, and as pack-horses go, he went, bucking and straying and causing trouble for his master, Joe Billings, prospecting for gold in the Frying Pan Mountains south of Jasper Park, Alberta. But now he rests with a monument at his head and a fond memory in his master's heart. Pickin's were mighty thin last summer, and Joe just about gave up. To make matters worse, on the day he was to strike back to the Canadian National Railroad, 60 miles to the north, "Soapy" ran away. He followed him and found him—standing on rocks bearing rich veins of gold. Only the best of rewards was good enough for "Soapy," Billings thought, so he arranged for a whole field of clover for the pack-horse that had made him rich. But, alas, the stomach used to sparse mountain grass could not stand the diet. So now other pack-horses are lugging out the gold he found.

Farming Terrapin

With the resumption of the terrapin market in North Carolina, partially due to the open season after five years of protection, as well as to general prosperity, terrapin farming in the Tarheel State offers an attractive field. There is only one commercial farm in the state now, that owned by James O. Bowden on Wrightsville Sound, near Wilmington, the Conservation Commission reports. The U. S. Bureau of Fisheries conducted a large farm at Beaufort in 1909, where thousands of animals were turned out each year, but decrease in prices caused it to be closed.

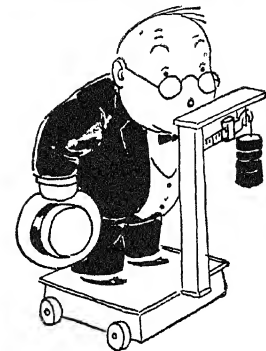
Farm Beautification

Landscaping and planting about the farm are covered in an excellent new pamphlet from the U. S. Department of Agriculture, entitled *Beautifying the Farmstead*. This is listed as Farmers' Bulletin No. 1087 and can be obtained from the Superintendent of Public Documents, Washington, D. C., for 10 cents.

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A list of suggested foods for reducing diets, with their protein grams and calories per average serving is given in "Reducing Diets", appearing in February *HYGEIA*. This article contains seven menus and recipes with a caloric range of from 1076 to 1504—showing the wide range of diet possible while reducing **SAFELY**.

"Reducing Diets" is a treat for all the family. Don't miss it in the February *HYGEIA*.

Schedule for February HYGEIA

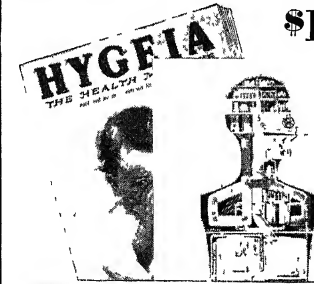
A galaxy of splendid health articles is included in the February issue of *HYGEIA*, the Health Magazine of the American Medical Association. Included with the above feature, is "Cancer of the Mouth—Its Prevention and Cure", "Lying Labels—Banned by the Food and Drugs Act", "Prevalence and Treatment of Syphilis", "How Does Your Child Talk?", a health play for children, the editorials, etc. *HYGEIA* provides accurate health information interestingly written, which helps safeguard the health of you and your family. Subscribe now at the special introductory offer.

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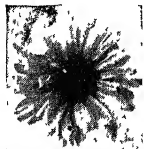
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"If the initiative, independence, and integrity of our people are to be preserved, we must in some way help our youth to love and appreciate the world of Nature. They must be interested in the forest life, must come to know the secrets of bird life, must love the simple beauty of the wild flowers. In this way they may find in their lives the same refining, invigorating influences that were enjoyed by their fathers. Only by Nature contacts can they be saved from the softening of moral fiber that is the sure result continuous subjection to the influence of the artificial life of civilization."

"In its spiritual influences, Nature plays its greatest benefit. Free from the prejudices and creeds of human interpretation, it speaks a language of universal appeal. Revealing the wisdom of the Infinite, it teaches man the value of higher things. In itself it leads the mind away from all that is low and tawdry, it appeals to the deepest instincts of integrity and uprightness, and by its quiet, simple beauty, it reveals the true greatness of simplicity. Unconsciously the Nature student grows to appreciate the value of a noble character, and by contact with Nature he learns those elements that make his life fragrant with the graces of a high spiritual life."

"It is a remarkable fact that great naturalists are always men of true refinement, gentleness of character, deep sympathies, clean lives, and profound spiritual vision. The daily contemplation of Nature has wrought into their lives all those qualities that we so much admire. Surely these same influences ought to be made available to the children and youth of today, if we hope to develop in them the fundamental principles that make for strength of character."

Winter Camping

All the summer comforts of camping are embodied in the new \$10,000 winter camp grounds on the north side of Yosemite Valley in Yosemite National Park according to the Park Service. It is located not far from Yosemite Lodge, in the "sunshine belt," and with easy access to the toboggan slides, ice skating rink, and lodge cafeteria, in a spot much warmer than the others. Travel in Yosemite has increased twenty-three percent since October 1 over the same period last year, and it is expected that the new camp will bring a record attendance this winter.

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THE OCEAN RIVER

(Continued from page 92)

make a complete circuit of the ocean. As long ago as the year 1846 an Englishman, Colonel Sabine, suggested the taking of regular observations of the strength of the current in the Straits of Florida as a possible means of anticipating weather conditions in the Old World. It is interesting to recall this suggestion at the present time when, through the enterprise of Professor C. F. Brooks and the American Meteorological Society, an effort is being made to get accurate records of the amount of heat transported daily through the Straits by the Gulf Stream water. The temperature of the latter is measured regularly by observers on the car ferries plying between Key West and Havana, and the speed of the current is determined approximately from the plotted drift of the ferries. Meanwhile several vessels following routes that cross the Gulf Stream farther north are obtaining detailed cross-sections of its temperature by means of sea thermographs, which make continuous automatic records and daily measurements with ordinary water thermometers are made at many other points, so that a good beginning has now been made toward "budgeting" the heat supply of this famous ocean river.

For Rose Growers

How to Grow Roses is a book of long and popular standing in the field of horticultural literature and there now comes to hand this volume in its seventeenth edition, enlarged in size and entirely rewritten. Its authors are Robert Pyle, J. Horace McFarland and G. A. Stevens. So thoroughly established is this book that it is hardly needful to say that it should be in every rose grower's library. It is published by Macmillan and sells for two dollars.

Carelessness Strikes

Forest fires, a large percentage of them caused by carelessness, stalked over the land last summer and took fourteen employees of the Forest Service, as well as many lives of private citizens. These fourteen lives were snuffed out in battling flames in many cases caused by a dropped match or cigarette, or someone's logging engine being run without a spark arrester. The North Pacific District, which was ablaze most of the summer, due to the excessive dryness, took a toll of six lives, while the Northern District, Montana and Idaho, reports four deaths. The past season recorded many brave deeds and acts of personal sacrifice and coolness, and heroism was as prevalent as if the men had been under fire. That such men should be offered up on the altar of human carelessness is much more deplorable than the loss of millions of dollars caused by people who just "didn't think."

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NATURE IN PRINT

Evolution Again

Popularly-presented books on evolution are becoming interesting to publishers, the last to come to our attention being *The Story of Evolution* by Benjamin C Gruenberg. The author states that it is not the purpose of his volume to prove or disprove "evolution," that noun with so many connotations and which to the ill-informed means only that man is supposed to be descended from the monkey. What Dr Gruenberg is concerned with in his book is "the process whereby the stream of life continues down the ages to manifest itself through new individuals that differ from one another and that form constantly changing groups of species." He has gathered together the data, presented the various theories and proved facts in attractive style and has turned out a volume of interest to those who wish to think. D Van Nostrand are the publishers and the book sells for three dollars.

An Understanding Book

"Wherever there are animals I find happiness and peace," is the first sentence in Paul Eipper's book, *Animals Looking At You*. The author has been a patron of the zoological parks and the circus menageries all his life and has studied and watched animals in captivity. From out of these years with his hobby he has taken many entertaining and interesting experiences and anecdotes and assembled them at random in one book which has been popular in Germany and is now appearing in ten different languages. It is brought out in this country by the Viking Press and sells for three dollars.

About Perennials

With our northern gardens dormant at this time of year *Perennials of Flowerland* by Alice T A Quackenbush is a particularly happy book to turn to. Many will soon be planning their 1930 gardens and poring over the catalog, and this book will be a mighty handy one to have at one's elbow while engaged in this fascinating task. The author gives advice on both selection and care of the perennials. It is published by the Macmillan Company and sells for \$1.50. It is listed on our book page.

Barro Colorado

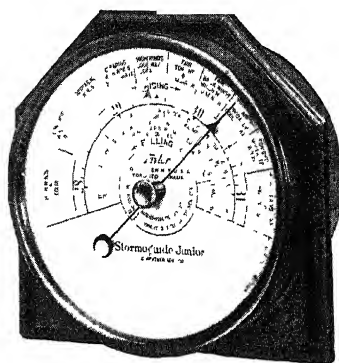
In the January issue of *Nature Magazine* Dr Alfred O Gross wrote of Barro Colorado Island in the Panama Canal Zone. Undoubtedly the necessarily brief article whetted many appetites for more about this sanctuary of the tropics. These appetites will be thoroughly satisfied by acquiring *My Tropical Air Castle* by Frank M Chapman, Curator of Birds of the American Museum of Natural History. Dr Chapman confesses in his preface that, since boyhood, he has always cherished a passion for the tropics, and he gives to this story of what he saw at Barro Colorado, therefore, the full benefit of his lifelong enthusiasm. This

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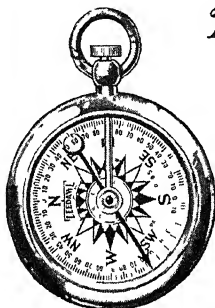
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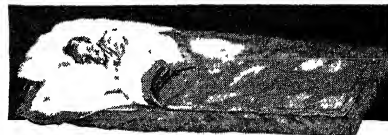
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man. Bulletin 470 of the New Jersey agri-
cultural Experiment Station

Test Your Soil For Acidity by C. M.
Linsley and F. C. Bauer. Circular 346 of the
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Many are the volumes, pamphlets and
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unpronounceable species of little-known in-
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of exhaustive research to reach us is a little
green book with the title, *The Golfer*. It
turns out to be the findings of the Mashie
Niblick Research Foundation, compiled and
prepared for public view and reading by
Russ Edwards (sh! Russ Edwards is our
Director of Educational Publicity and looks
up on every third shot). The Foundation
has attacked this problem and sought, rather
successfully we feel, to get at the root of
this golf matter and to find out what makes
the golfer tick. A review of this book may
not be technically legitimate for our Nature
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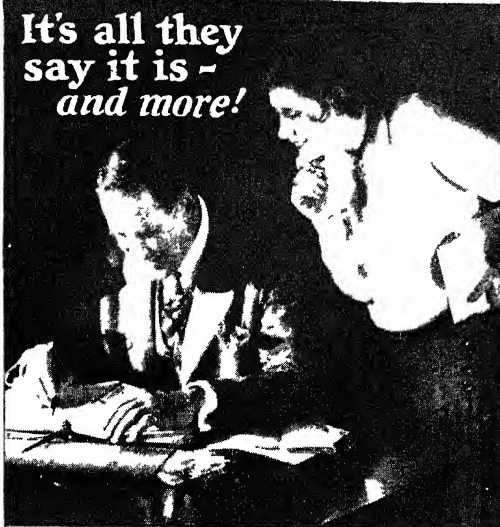
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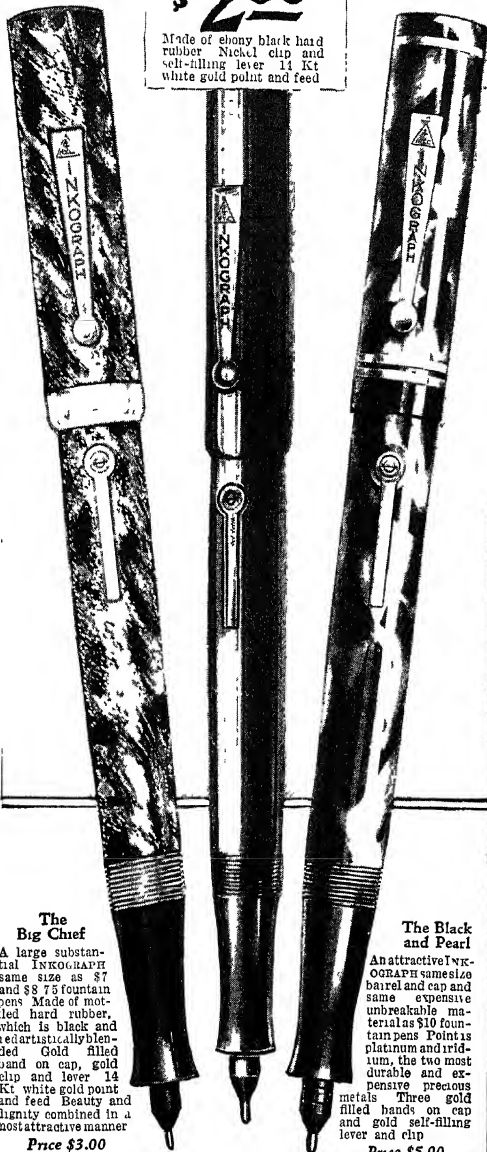
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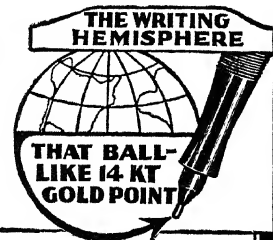
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The State of Colorado is discussing birds, —which is fine. The people are being called upon to consider which is the most appropriate bird for selection as the official State Bird. There appear to be two main contestants for the honor,—the bluebird and the lark bunting. It is a question which the Legislature of the State will be called upon to decide on the basis of expressed public opinion. It appears that the bluebird has a large number of supporters, as might be expected with a bird of such loveliness. It appears, also, that the lark bunting is gaining more and more friends, as might likewise be expected with a bird of such beauty of plumage and flight, such joy of song and such distinction. In fact the greatest strength in the argument for the bunting lies in the fact that it is much more distinctively a Colorado bird than is the bluebird, which has already been selected to serve as the State Bird of other States. Of course the bluebird considered is the Mountain Bluebird, which seems also to argue in favor of the bunting, a bird of more general distribution throughout the State. The selection of a State Bird is Colorado's own affair and one in which we have interest but not influence. We hope that there will be free and full discussion, because through this means will be aroused interest in birds generally, and we hope that whichever bird Colorado may select it will be chosen through the expression of widespread opinion.

Virginia Bird Lovers

Nature lovers in Virginia will be interested to hear of the formation of the Virginia Ornithologists Society which came into being at a meeting of a score of interested people at Lynchburg College, Lynchburg, Virginia. Professor Ruskin S. Freer of the College faculty was chosen as president of the infant organization. It is planned to form divisional groups under the general head of the society. President Freer states that while the main aim of the society is for the advancement of the study of birds and for working with ornithologists in other states, the scope of its work will include the teaching of conservation of wild bird life and educational work on the economic and esthetic values of birds. All interested Virginians should get in touch with Professor Freer.

Golfers Attention

When snow blankets the fairways and the sand traps look less forbidding as mounds of white, there are still birdies on the golf course. They are not, however, run up shots that pop into the cup or long rolling putts but the real birds around the course. The National Association of Audubon Societies has a Golf Club Bird Sanctuary Committee which includes in its membership one Robert T. Jones, Jr., well-known authority on birdies even though not in the ornithological sense. This committee has issued a call to

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golf clubs to consider their bird residents during the winter months and to provide much-needed food for them. The circular containing specific instructions for feeding points out that birds die in the winter not from cold but from lack of food. This circular can be obtained from the National Association of Audubon Societies, 1974 Broadway, New York.

Our Wild Orchids

One who loves orchids will go without a meal or two if necessary to add to his library *Our Wild Orchids* by Frank Morris and Edward A. Eames. Here is the story of some seventy-two species of orchids known to be native to the northeastern United States and Canada, west to Minnesota and south to Tennessee. It is not merely a listing and botanical description of these lovely plants because the authors have infused the volume with the spirit of the trail that is followed in search of the orchid. The book grows out of years of hunting and study and photography (the illustrations number 134, all full page and four in color) and is a volume for the future. There is, also, much more than mere orchid lore in the work, because other forms of wild flora and fauna met in the search for orchids are brought interestingly into the volume. The number of illustrations and quality of the book as a publisher's achievement make necessary the price of \$7.50. The publishers are Charles Scribner's Sons.

Shelford on Ecology

In *Laboratory and Field Ecology* by V. E. Shelford, are presented the results of life studies in a state of nature, and in the laboratory where conditions simulating those of nature, but which can be controlled, have been maintained. Until comparatively lately field observations on animals were almost the only means of ascertaining their habits and life processes. The importance of field studies cannot be overestimated, but it is evident that they must sometimes be supplemented by experimentation under conditions where the quantity of food, the degree of temperature or humidity, or the chemical composition of the soil, may be measured accurately.

Ecological studies, the relations of communities of animals and plants to their environments, are of tremendous importance. When we consider the effects, for good or ill, that the codling moth, the potato beetle, the cornborer, the honey-bee, or the silkworm, exert on human activity, the desirability of learning as much as possible about the influence of food, temperature, humidity, soil and other factors on their growth, fecundity, longevity, hibernation, abundance and death rate, must be apparent. This book describes methods of procedure and equipment that aids in such studies. A bibliography of more than a thousand titles is an important feature of the work. The volume is from the press of Williams and Wilkins, Baltimore, Maryland, \$10.00.

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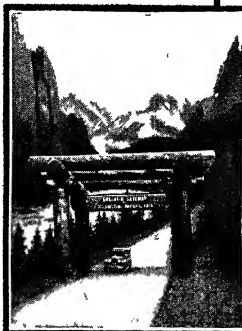
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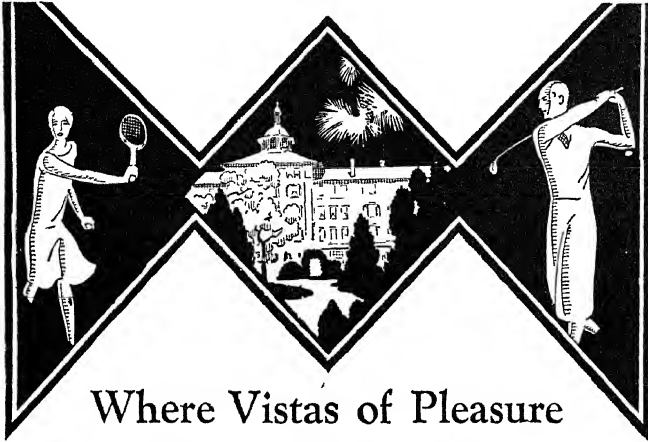
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Travel Dept., NATURE MAGAZINE



MANY European pilgrimages for 1930 will center around the Passion Play at Oberammergau, in the Bavarian Alps, where, every decade since 1633, the villagers have portrayed this magnificent event to carry out their pledge, made at a time of pestilence nearly three hundred years ago. The story of these players is well known. From early youth, their sole aim in life is to be able to play a part in the greatest of modern tragedies,—their entire existences are devoted to one purpose. More than 300,000 people are expected to visit this little town, beautifully situated on the banks of the shining Ammer river, during the season, which lasts from May 6 to September 28. The Canadian-Pacific Steamship Co. will help arrange for tickets to this drama, and is one of the many lines offering excellent service to the Continent.

* * *

Among the many guilds that mark the present age, the Travel Guild serves a most useful purpose, which is to show Europe completely, luxuriously and reasonably to Americans. In 1930 it is offering a number of all-motor trips on the Continent, the first, it is believed, that have come into existence. These tours have the advantages of motor travel, and in addition penetrate the heart of the countries visited rather than merely flung the much-travelled routes. They vary in duration from twenty-nine to seventy-four days, cover from three to ten countries, and range in cost from \$395 to \$1,007. In addition, several shorter trips are planned, among which is a very delightful jaunt through rural England, lasting a week, which costs but \$85.

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As a part of its service, the Cunard Line is adding, in connection with certain of its ships, personally-conducted land excursions to Germany, the Continent generally, Czecho-Slovakia, Ireland, and Lithuania. These vary in length and expense, but it is promised that they will be very different from the usual run of tours. The conductors are all employees in the Cunard service and especially trained for the work.

* * *

"Wings over Europe" is more than a play,—it is an actuality. A host of air companies have sprung up and offer prices that are not tremendously higher than rail rates, accommodation considered. Airlines ply between the leading cities with

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* * *

The West Indies, in March, are increasingly popular A host of steamship companies are offering attractive rates for cruises throughout this section guaranteed to put back the bloom of health on anybody's cheeks The Royal Mail Steam Packet Company are listing popular-priced vacation cruises lasting fourteen days for as low as \$140 These include Nassau, Havana, Santiago, Kingston and Port-au-Prince Somewhat more sumptuous and lengthy are the trips of the Cunard Line, which now has four liners plying in this trade Its trips range from nine to eighteen days, and cost from \$175 up

* * *

The Pan-American Airways, which link the northern cities with the sands of the Bahamas, Central America, and South America, by a bond of but a few hours, offer some of the most delightful trips on the American continents The principal ports of the West Indies are covered three times a week by great tri-motored planes as safe as trains, and Miami and Brownsville, Texas, have become practically adjoining cities with Cristobal, Baranquilla, Panama City, San Juan and a number of others In flying from San Lorenzo to Havana one crosses the entire Yucatan country, inaccessible by rail, where once the Maya civilization ruled and where the ruins of their cities rise grotesque from the impenetrable jungle From the air one can see for great stretches both oceans—the Atlantic and the Pacific, at once This is the ideal way to travel, and one which, incidentally, another generation will be thoroughly devoted to.

* * *

The Alaska and the Yukon Territory country is picturesque, romantic and different In summer and late spring, it is as beautiful as a tropic country, and as comfortable as any spot in the United States To follow through the Athin, Klondike, and Tanana districts, along the famous Trail of '98, to see the marvels of the Sawtooth range, Five Finger Rapids, Dawson City, to roam the streets of Skagway, a city of blood and thunder at one time, or to traverse in pleasant steamers the lakes such as Athin is to enjoy a marvellous treat.

* * *

Although the announcement of the 1930 plans for the American Nature Association came but a short while before this was being written, a number of individuals had already "signed up" for the Inner Passage trip, and several for Jasper Park, Glacier and Yellowstone. If you have not received a copy of "On Western Trails" and are thinking of partaking of a personally-conducted, naturalist-led trip with a group of "real people," please advise this department



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YOSEMITE & MARIPOSA BIG TREES

NATURE IN PRINT

Stranger than Fiction

To the scientist, particularly the biologist, it must be a constant, never failing mystery why so much fiction is written, when on every side, in the myriad aspects of life, realities pulse and glow with more romance, more climax and more thrills than ever did a Jules Verne tale. Consider, for example, *Nature Narratives*, by Austin H. Clark of the National Museum. In the space of 132 pages, Dr. Clark has crowded true tales of some of the strangest creatures of life—the water sprite, the sea-snake, sea horses, the Cecropia moth, enormous earthworms, and sundry other members of the animal kingdom. He tells about footprints in the rocks, sea serpents, why the sea dies, how the shark intoxicates, how some flies wave their eyes on stalks,—and tells about them as one revealing important secrets. There is little doubt but that the purpose of the book—"to stimulate the reader to delve further into the subject of biology and to form a real acquaintance with the living world"—is served, in fact, it is most difficult to keep down a growing desire to go a-fielding to make discoveries for oneself following a perusal of it. The publishers, Williams and Wilkins, Baltimore, Maryland, announce that this is Volume I. We will eagerly watch for Volume II. The price is one dollar.

North American Mosquitoes

Many of us can remember when malaria was supposed to be caused by night air, marsh atmosphere, or even mist from waterfalls. Then, about 1900, several eminent entomologists, working more or less independently, discovered that this widespread disease was carried by mosquitoes of certain species, and that other species were responsible for yellow fever. These discoveries led to means of repressing the vectors, and many areas, from which the white race had been practically barred, were opened to peaceful occupancy. The study of such relations has proceeded, and a vast literature has resulted. Two other diseases, dengue and filariasis, less well-known but of serious importance, have been added to the list of maladies that are spread by these literally pestiferous insects.

Mosquitoes are of great interest to lovers of the out-of-doors. Apart from their disease-bearing potentialities, their stings, and to some sensitive persons their mere presence, make life in their company a wearisome ordeal. About 2,000 species are known in the world, of which the Americas have more than 500. North America, north of Mexico, has about 123 species. These breed in marshes, field and woodland pools, puddles, rainbarrels, cisterns, discarded tin cans, and leaves of pitcher plants. Many of these habitats harbor several species that succeed each other as the season advances. Most are at least irritating, a few are harmless, as far as known.

To furnish means of identifying, studying, repressing, or avoiding the more dangerous



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of our North American species is the purpose of a handbook *The Mosquitoes of North America*, by Robert Matheson, Professor of Entomology of the New York State College of Agriculture at Ithaca, New York. The illustrations are many and serve to make clear the life histories of the species, and the protective measures. The book is from the press of C C Thomas, Springfield, Ill., and Baltimore, Md. The price is \$5.50 E A P.

Nature Books

Under the editing of Hartley H T Jackson of the Biological Survey, the Charles C Thomas Company is issuing a series of Nature Books, covering a miscellany of subjects—birds, mammals, stars, clouds, rocks, trees and a host of other aspects of Nature. Their purpose is defined to be to "disperse authentic natural history in many aspects in a dignified, readable and appealing form." The introductory volume, *Denizens of the Mountains*, by Edmund C Jaegar, has just been issued and if the rest maintain the high level set by this book, their usefulness in the school-room and library cannot be doubted. As one who knows them and has studied them, and who has—still more—found a facile pen for expressing his love for them, Mr Jaegar traces the wood rat, the coney, the mountain chickadees, the Clarke nutcracker and a host of other birds and animals over the High Sierras and Rockies, with no attempt to romance or anthropomorphize. This volume can be obtained from Chas C Thomas at Springfield Ill., for \$2.

Selborne de Luxe

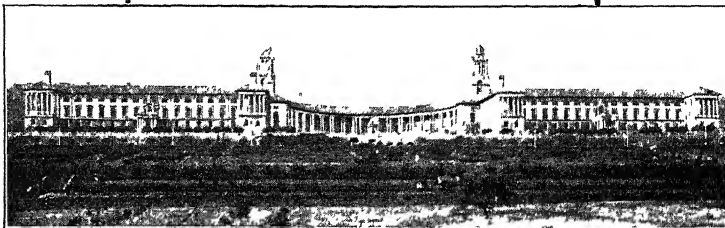
Gradually Gilbert White's *Selborne* has attained the position of a classic. This has arisen not alone out of its interest and value as a natural history document, but also by virtue of its importance as a contribution to English literature. It is not, therefore, our purpose here to review *The Natural History of Selborne*, which now comes to us from the presses of E P Dutton and Company. It is rather for us to record that there is now available, for those who can afford it, a perfect *Selborne*, edited with an introduction by E M Nicholson and illustrated with woodcuts by Eric Daglish. It is a beautiful and charming volume, a substantial volume, fit to grace the shelves of every lover of Nature and the outdoors. It will be found listed on our Book Page this month.

Nature Lore

With fellow editorial feeling we greet *Nature Lore*, which came into being with January of this year under the editorship of Carlos Tribble of Pueblo, Colorado, ably assisted at the mimeograph by three other Boy Scouts. Brother Editor Tribble makes the rather broad offer that he will send the magazine free to anyone desiring it. We would take the liberty of suggesting that a stamp or two might help him out if you write to him at the editorial sanctum, 734 Palmer Avenue, Pueblo Good luck, Brother Tribble and associates, it's a good cause.

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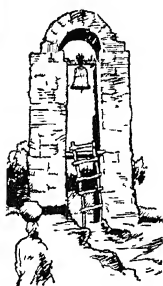
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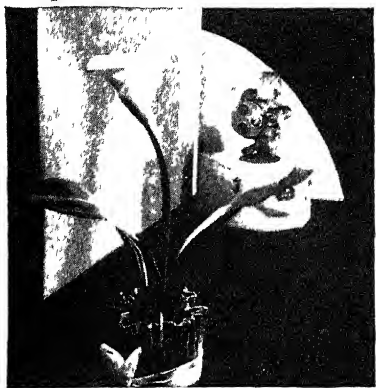
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THE picture herewith is interesting both from the point of view of photography and for what it shows. It was taken by Oscar E. Monning of Fort Worth, Texas, and is of the foot of a bed made of what is known as Circassian walnut. The picture, if you will turn it lengthwise, reveals



strikingly the head and shoulders of a man, eyes closed and with a well-shaped, pointed beard. Perhaps you can see something else with it. At the same time the picture demonstrates the ability to get detail which is inherent in a Graflex. This picture was taken with a Graflex and K3 filter on a panchromatic film and was an interior time exposure.

* * *

DeVry Still Camera users will be interested to know that a new Graf-DeVry 2" f 3.5 Anastigmat Lens, designed especially for the person desiring the more difficult and unusual pictures, has been added to the DeVry Line of motion and still picture equipment. The new f 3.4 lens is interchangeable with the standard lens furnished with the DeVry Still Camera. In addition to the lens' unusual speed it is equipped with a wide variety of stops and accurate focusing adjustments which aid the amateur in securing unusually fine pictures. The DeVry Still Camera is unique in that it shoots 40 pictures to a loading and uses standard 35 mm motion picture film. Enlargements of any size may be made from

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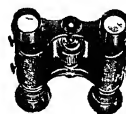
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* * *

Michigan is a State with a real State Department of Conservation that is doing a fine work in many directions. One of these is in making available for loan to schools and organizations motion picture films on the natural resources of the State. These films, which are made in the 16 and 35 mm sizes, are loaned with no charge except the payment of transportation costs. There are reels on bird life, mammal life, fish and fisheries, forestry and other subjects. The films are handled by the Educational Division, Department of Conservation, Lansing, Michigan.

* * *

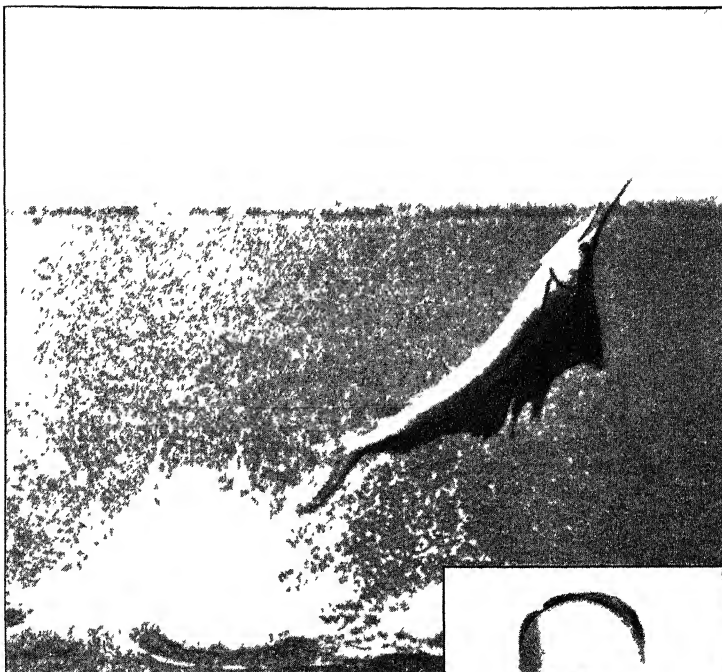
Also of interest in the field of educational films are a number of reels on biology and natural history brought out by the Carter Cinema Producing Corporation, 551 Fifth Avenue, New York City. The reels are available in both 16 and 35 mm sizes at rental prices of \$2.50 a reel. Space does not permit the reproduction here of the titles and description of the various films, but individuals and organizations interested in this excellent list may obtain it from the company at the address listed above.

* * *

The troubles of the amateur movie enthusiast in keeping his films in the proper condition on the trail are solved by the Bell and Howell Company, who have recently issued a Filmador, combining the qualities of the thermos bottle and the humidor to give the right conditions of temperature and moisture to films placed inside it.

Different Maps

Something original and useful in road maps is being worked up by George S. Lee and Company of Rutherford, N. J., who are distributing "recreation maps," which give some indication of the natural beauties along highways. Instead of giving prominence to cities and towns in order of their population, and leaving gaps in the map between them, these new-type guides consider every feature in the order of its "recreational value." White Sulphur Springs and Charlevoix appear in larger type than Milwaukee. Estes Park, Cumberland Falls and the sights along the Redwood Highway get more attention than New York and Kalamazoo. Early in the spring, the company will issue a book called "Vacation Tours," containing twelve two-week motor trips from New York City, and other maps are in course of preparation. They should find a ready market.



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present, is indexed in the Read-
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NATURE MAGAZINE is published monthly by the American Nature Association
Entered as second-class matter May 31, 1927, at the post office at Washington, D C
Additional entry at Greenwich, Conn

*Subscribing Membership
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back pages of the magazine*

Publication and Editorial Office, 1214 16th Street, N. W., Washington, D C

Additional Offices of Publication, Greenwich, Conn

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THE BALD EAGLE, OUR EMBLEM

—
An Editorial

IN ALL ages and among many nations the eagle has been considered the king of birds. In ancient mythology he was held sacred to Jove, who had dominion over the seasons and held in his grasp the lightning. In early historic times many nations paid it special reverence, and the Romans, following the earlier example of the Persians or Assyrians, made it their ensign. More modern countries—France, Prussia, Italy, Mexico, have chosen its figure to adorn their standards. It was natural, therefore, that America should adopt its own fine species as its emblem. Since 1782, when it was formally chosen, the eagle has been selected to appear on the official flags of Illinois, Iowa, Kentucky, Michigan, New York, North Dakota, Oregon and Utah. His image also figures on various flags, standards and seals of the United States, of the Army and Navy, and of the President and his Cabinet, and on several of our coins.

The bald eagle is found in all our states and in Alaska, and may, therefore, come within the ken of every citizen. There exists in Nature scarcely a sight more inspiring than such a bird soaring in majesty over mountain crag or towering forest. And as a country needs qualities other than weakness, so it was fitting that we chose for an emblem a bird whose qualities include strength, courage and hardihood.

But how have we treated our emblem? Though it is true that in about thirty-one of our states, those that have adopted the "Audubon Bird Law", the eagle is protected by inference, and in a few others it is specifically protected, the remaining states either have no laws in its favor, or place it on the list of unprotected birds. And it is rare that a killer of our eagle is punished in any manner.

Since in most of our states the advance of settlement has naturally reduced the range suitable for its continued habitation, in parts of Alaska only can the eagle now be counted abundant. Yet this

territory has voluntarily chosen to bear the ignominy of putting a price on its head. Other countries may have failed to protect the creatures chosen to adorn their standards, but we believe that ours is the first to allow a bounty for killing the bird formally selected as its emblem.

In 1917 the legislature of Alaska, on the plea that the diminishing supply of fish and game was due in part to the eagle, passed a law placing a bounty on the bird. This law is still in force and the feet of upwards of fifty thousand of the birds have been redeemed, some for twenty-five cents each.

But after a century and a half of indifference to the fate of its emblem, we note that the Congress of the United States is considering a bill to make the killing of the American Eagle anywhere within the territorial limits of the United States a federal offense. This bill is said to be sponsored by the National Association of Audubon Societies, and the National Committee on Wild Life Legislation. While gratified that our Government has at last taken steps to protect this bird, we believe that the proposed bill is deficient in many respects, and especially in the lack of an appropriation. But a beginning has been made and we hope that it will lead to more adequate protection for this vanishing species.

The destruction of certain birds and animals, on the plea that they are inimical to game birds or animals, or to other interests, but whose preservation from many points of view is desirable, is becoming much too common. Let us be more charitable toward the more interesting of our predatory birds and animals. At least let us refrain from killing our national bird for fifty cents or a dollar. If a few eagles have been standing in the way of Alaska's prosperity may we not hope that, with twelve years of destruction, the crisis has passed. Let us hold our national emblem not only on our banners and coins, but in our hearts.



... WHETHER BY STARLIGHT OR
MOONBEAM, THE LITTLE SCREECH
OWL IS EVER ALERT FOR MOUSE
OF FIELD OR WOOD

NATURE MAGAZINE

Volume 15
Number 3

March 1930



NAPPING DURING A WINTER DAY

FRANK N. WILSON

The long-eared owl is one of the most beautiful and useful of our species

OUR OWLS in FABLE and FACT

The Romantic History of a Much Persecuted Race

by Edward A. Preble

WHEN the southern mountaineer puts a fire shovel in the rosy embers, that its gathered heat may burn the toes of the shivering screech owl and prevent it from working its direful magic on his household, he is but responding to the remnant of a belief or superstition that has come down to us from antiquity. The white woodsman, whether he knows it or not, reweaves in his superstition the slender but tenacious threads of half-whispered legends of early European culture; his black companion from Africa may well

have brought this half-believed dread of the bird of the night from that land whose unlettered past perhaps holds concealed as much of myth and mystery as the better chronicled lore of Greece and Rome

Many ancient peoples have woven the birds and beasts about them closely into the warp and woof of their religious beliefs or folklore, and, with the keenness of observation of those who live close to Nature, have made ample use of the mental and physical characteristics of their companions of the wild. Naturally to the

POSING AT A FENCE CORNER

*These young great horned
owls would welcome a few
mice—wood field, or house*

THE MOST POWERFUL OF ALL

*Though outlawed in most
sections, the great horned
owl is more friend than foe*



J. C. ALLEN

owl has fallen a generous share of such lore. Owls are birds of the night more often heard than seen, and in the minds of the uneducated and superstitious are often creatures to be dreaded because endowed with unusual powers. Always the poets and romancers have been quick to seize upon these fancies, and therefore we find the owl playing important rôles in annals of the dark and mysterious, and often in evil company.

In ancient Grecian mythology the owl was sacred to Minerva or Pallas Athene, the goddess of wisdom and the useful arts, and this fact and the natural respect that seems owing to a bird that is prone to assume an attitude and mien suggestive of deep thought, and still says little or nothing, have kept alive in the minds of many the concept of the owl as a bird of wisdom. Also he can see in the dark and therefore must know many things that are hidden from creatures less well endowed. The fancied connection of the owl with the fortunes of certain characters of the ancient mythologies, and the attributes ascribed by the ancients to the bird, are curiously reflected in the scientific names that have been applied to various species.

The Romans of old viewed the owl with distrust and even dread. They considered it as a messenger of death, and we read that the debates of state were sorely interrupted whenever an owl obtruded its presence on the

neighborhood. Owls, indeed, prophesied the deaths of several Roman rulers. The modern Romans, however, seem to have lost this fear, and with it much of their respect for the owl, and indeed for bird life of any kind, and now use tethered owls as lures to entice into their snares the innocent small-bird migrants on their way to other lands.

Perhaps because of the owl's natural prowess, we find that in early historic times his image was worshipped as a war god by the Esthonians on the Baltic, and this circumstance may very possibly be an echo of earlier ideas widely prevalent among some of the ancient tribes of the region that we now call Europe. The old Hebrews must have had in mind that the owl was a favorite of the heathen gods (if we presume no error in translating), when they classed it with those birds which were unclean and must not be eaten. Parts of the owl are proper ingredients of witches' brew, according to the poets, and of certain remedies for disease, if we may believe the pharmacists of former days. To some the cry of an owl augured ill for the new-born infant, and even if evil should be fended off on that occasion, yet it failed not to pursue the child as it grew older.

Some ancient peoples believed that the owl sucked the blood of helpless babies, and even the wise Pennant, who was usually quick to detect and discard the improbable, quotes Ovid to this effect, and seems inclined to credit the fable. As a purveyor of bad news, with its apparent eagerness to deliver its message when it haunts the rafters of the fated house, the observant Chaucer thus refers to the night bird:

"The oule at nyght aboute the balkes wonde,
That prophete is of woo and of myschaunce."

As a nocturnal bird, heard in the depths of woods and other places where loneliness prevails, the owl has been considered in many lands to be connected with death either in the role of prophet or herald. Watchers with the sick hear the cry of an owl, sometimes startling, sometimes indicating depths of sadness, as if the singer had some unforgettable sorrow and must needs share it with the world. Such a voice naturally bears a foreboding message to the minds of those who fear that death



W. E. SHERWOOD



THE SPOTTED OWL
OF THE WEST
A frequent dweller in caves

A PAIR OF ELF OWLS
Birds of the giant cactus

THE SCREECH OWL
AT HIS HOME
*A fine example of protective
coloration and pattern*



R. B. ROCKWELL

may be hovering near The Spanish have a legend that before the death of Christ the owl was a sweet singer, but that in memory of that time he now shuns the day and has but a harsh voice. In some countries it is the larger owls that bear sinister reputations, while the smaller species may be regarded as harmless or even be accorded a measure of affection as the friends of man. Both Shakespeare and Chaucer (as we have seen) refer to owls as harbingers of death or lesser woe, and perhaps have helped to bring to us from ancient times those vague beliefs of the owl's relation to trouble that some of us still cherish.

The written word, however, can not explain why many peoples in distant lands have credited the owl with aiding in the task of guiding the souls of men to Paradise. Students of mythology have traced the owl as an agent in this errand among the beliefs of the ancient Tuscans, and it is very interesting to find among some of our own native California tribes the belief that the ghosts of the dead become owls, and journey away on the path of the wind, and may even return and do injury to their former associates. Among the eastern Cherokees, also, owls are embodied spirits, and their cries are dreaded. But the birds' real powers are turned to good account, for if the eyes of a child be bathed in water made potent by soaking the flight feathers of an owl, he will always have the power to keep awake at night. But lest this power be too easily acquired and thus lose its virtue, it is prescribed that the feather must be one found by chance, and not by special search.

Another interesting though unrelated legend is found among the Eskimos, who explain the creation of the owl by the story of a maiden who, as a punishment for some wrong committed, was changed by the displeased god to a bird. In her terror she dashed blindly about until, from striking in her heedless flight against an icy wall, her beak was bent into a hook and her face flattened. Ever since then owls have been birds of the night, seeking to hide their ill-formed faces from the eyes of other birds, and voicing their grief and remorse. Others among our native peoples viewed the owl in various lights—some used its stuffed form as a sort of charm, some kept

the bird as a pet, some employed its feathers in their special ceremonies, some invoked its aid to frighten obstinate children into obedience.

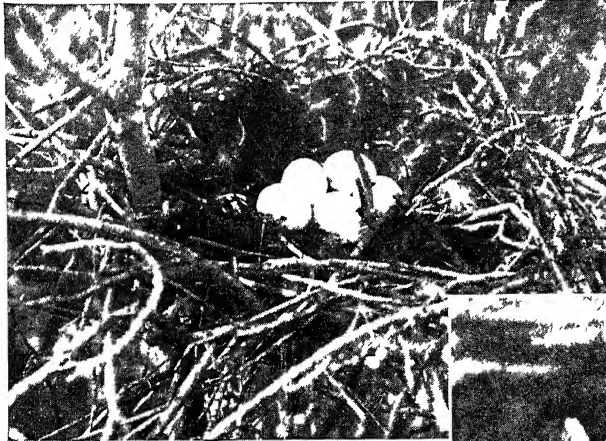
As a haunter of woods and caves, it was natural that the owl should take possession of towers and steeples, and especially deserted ones. By the Syrians it is called the "Mother of Ruins," and the poet, as Gray in his "Elegy," delights to people the abandoned works of man with owls, when night has stilled Nature's voices.

"Save that from yonder ivy-mantled tower,

The moping owl doth to the moon complain

Of such as, wandering near her secret bower,
Molest her ancient solitary reign."

Owls were formerly considered to be closely related to the hawks, but modern systematists are inclined to place them near that other group of soft-feathered night-flyers, most commonly represented in America by the nighthawk and the whippoorwill. In their food-habits, however, they greatly resemble the hawks whose labors they supplement, carrying on by night the task of keeping in bounds the hordes of mice and rats that without such checks must long ago have overrun the earth. In this office they are greatly aided by their soft plumage, since it helps to make their flight noiseless. If one examines the flight feathers of an owl, the reason for this silence is evident, for the tiny barbs are furnished



H. AND E. PITTMAN
NEST OF LONG-EARED OWL

In a twiggy home, often the abandoned residence of crow or hawk, these owls brood their eggs

each with the softest of fringes, through which the beaten air passes without the rushing sound that accompanies the rapid flight of the hawk or eagle

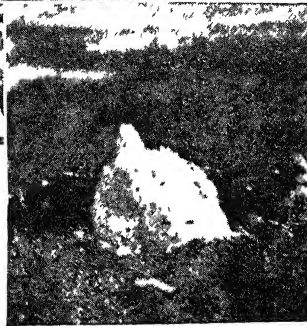
The good offices of owls have been so long known that it is a matter of wonder that it should be necessary to reiterate the facts. For hundreds of years, in various parts of Europe, small owls have been tamed or kept in gardens on account of their prowess as mouse catchers. It is a sad commentary on our intelligence that we have retained as a part of our heritage the superstition and savagery of our ancestors, rather than this useful knowledge, at the same time with unconscious irony excusing the persecution on economic grounds. To many persons owls are considered as pests, to be destroyed on sight. The farmer, occasionally losing a fowl that the great horned owl has picked from its unprotected perch in the orchard tree, forgets the good deeds conferred by the bird in other ways, and condemns the whole class of owls. If a game bird is found to figure in its menu, excuse is afforded for the wanton destruction of any of the tribe that are encountered.

Sixteen distinct species of owls inhabit North America, with several additional geographic forms. The great horned owl, *Bubo virginianus*, is widespread, ranging from the tropical forests to the limit of tree growth in the north. Scarcely inferior in size to the famed eagle owl of Europe, it is considered to be our most powerful species. In the far north, its usual prey is the varying hare, and it thus aids the lynx and other furred predators in reducing the legions that without these checks, and periodic diseases, must long ago have devastated our continent. In many a rough western canyon the demands of a brood of downy great horned owls, snug in their nursery on cliff or ancient tree, furnish the urge that results in the death of dozens of pocket gophers or ground squirrels that are the foes of the rancher.

The ordinary note is a deep-toned hoot, *Too whoo-who, whoo, whoo*; this has many variations. More rarely is heard a terrifying shriek, considered by some to be the hunting call, though usually, like the good hunter he is, the bird is silent when seeking prey. Those

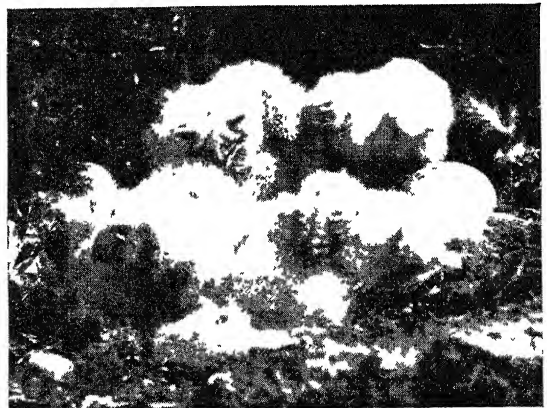
who find inspiration in the sounds of Nature will find it easy to forgive this fierce bird his occasional meal of grouse or barnyard fowl in return for the opportunity to hear his deep mysterious hooting in the lonely glen, or see him take his watchful perch on some favorite lookout tree in the gathering dusk.

In North America our owl of the church tower is most likely to be the barn owl, a close relative of the barn owl of Europe and called by the ornithologists *Tyto alba pratincola*. This is the monkey-faced owl of the newspapers, often credited with such rarity that its fortunate captor hopes to realize a small fortune from the first museum he reaches. As a matter of fact most collections are already supplied with specimens, and the curator would



O. J. MURIE

SNOWY OWL AND HER YOUNG
Thus she guards her eggs, later the fluffy chicklets greet the world



O. J. MURIE

rather see the owl alive than dead. If one who feels tempted to kill him could examine a few of the pellets that he ejects after each meal, and note the bones of rats and mice that form such an eloquent index to the bird's good offices, he could scarcely bring himself to destroy so friendly an ally. But good news travels slowly, and the thoughtless and ignorant are helping to bring the day when this beautiful species may actually be as rare as the uninformed now believe the "monkey-faced owl" to be.

The beautiful snowy or arctic owl, *Nyctea nyctea*, of circumpolar range, is another friend who suffers unduly at the hands of man. It is a bird of the northern wastes, where it lays its eggs on any little hillock that commands a view of the turfey plain. While the parents are raising their hungry brood the hordes of lemmings and of shorebirds render tribute to the keen-eyed hunters. Then comes the long winter when most of the inhabitants of that bleak land forsake it, and famine threatens the few carnivores that remain. Then the white owls must move south into the wooded country, where they claim a share of the myriad hares. If these fail also, they must go still farther, and so it happens every few

years that an invasion of snowy owls occurs in our northern states. The great birds are then the mark of every thoughtless gunner, and few of them live to return. Fortunately the diet of the visitors has been investigated by their friends, and the alien rat, whose ravages cost us millions of dollars annually, turns out to be such a frequent victim that the occasional fowl or game bird that is taken should not blind us to the value of the owl. So let us spare these rare visitors from Arctic lands, guests for a cold season.

One of the handsomest of our owls, but one that unfortunately is less often seen than formerly, is the long-eared owl, *Asio wilsonianus*. He is of medium size, and his extremely long ear-tufts are characteristic. The older ornithologists tell us of often finding several pairs nesting in such proximity that a colony was suggested, but most of us are fortunate if we find one nest. This is usually the abandoned home of a crow or other large bird, and may hold a half-dozen or even more of eggs or young. Yet in spite of its large families this is one of the owls that have suffered much from our unreasoning craze for killing. Its food consists largely of mice and other small mammals, though many insects are taken, and some birds, spiders, crayfish, small snakes, frogs, snails, and even earthworms have also been found in their stomachs. Forbush tells of one that had eaten a screech owl and in turn had fallen victim to a barred owl. The long-eared owl utters a clear scream, sometimes two-syllabled, and at times a rattling, rather musical, call, a variety of other sounds have been recorded.

The short-eared owl, *Asio accipitrinus*, is so called from its tiny almost hidden ear tufts. It is found throughout the northern hemisphere, and as is proper for a bird that lives so much in perpetual day, it is one of the most nearly diurnal of our species. Another peculiarity which may be attributable to its ranging so widely in northern lands is its habit of nesting on the ground, where it raises a large family. Few examples of bird courtship are more interesting than the aerial antics of the male short-

eared owl, as he swoops about high in air, uttering a variety of peculiar notes, and clapping his long wings together. This performance may take place during the day, especially if clouds be present. In its food habits this owl is generally beneficial. The great bulk of its

diet consists of mice and instances are on record of its materially assisting in the suppression of mouse plagues. Some birds are also taken, and many insects, including locusts.

The barred owl, *Strix varia*, is perhaps the commonest of our larger species. Its distribution covers most of eastern and middle North America. Though found in our northern forests, it is in the swamps of the south that one most frequently meets the bird, usually by way of its voice, which in mocking tones seems to ask the traveler "Who cooks for you, who cooks for you-all?" This call is frequently heard in the daytime, especially if the sky be overcast. In the mating season a variety of other ludicrous cries are uttered. The distinguishing characters of the bird are large size, untufted head, and black eyes. Early in spring the owl seeks some hollow in a large tree, or perhaps an open nest deserted by crow or

hawk. The eggs rarely number more than three, and like those of all owls, are white and rounded. The food habits of this bird entitle it to our protection for it seldom catches poultry or those creatures that man considers game. Mice and other small mammals are most commonly its food. In a number of cases other smaller owls have been eaten. When taken young this owl makes a very interesting pet, and several amusing accounts have been written by bird enthusiasts who have become possessors of a nestling and have raised it to maturity.

Though usually a bird of the lonely mountain forest or the deep swamp, the barred owl sometimes makes its home in woods close to cities, and even in cemeteries. Sometimes the sparrows or starlings, or the house rats, man's unwelcome guests, are the attraction that leads them to brave the dangers of such surroundings.

In our states west of the Rocky Mountains, from Washington southward, and also in Mexico, is found the spotted owl, *Strix occidentalis*, with several races. It is most closely related to the barred owl of the east, but is smaller in size, and necessarily differs considerably in its habits. It



PREPARED FOR ANYTHING

Though he recognizes his friends, this young horned owl resents the intrusion of strangers.

has been most closely studied in our southwestern states, where it nests on cliffs or in shallow caves in wooded canyons, or more rarely in the "witch growths" that appear on coniferous trees. Its repertoire is considerable, usually consisting of different combinations

of a musical cooing note. The nesting time is spring and two or three eggs usually comprise a set. The food, as far as known, consists almost entirely of wood rats and other rodents. Captive individuals have persistently refused to accept the flesh of birds, both wild and domesticated, and were just as consistent in their eagerness to take at any time chipmunks, ground squirrels, and mice, as well as domestic rats.

The great gray owl, *Scotiaptex nebulosa*, is the largest though not the heaviest of our owls. Some of the native tribes in its range, which covers most of the great northern coniferous forest, pay it the highest possible tribute when they call it the real, or Indian, owl. Though longer in body, and broader of wing, the bird is inferior in strength and in size of body to both the snowy and the great horned. Still it has no difficulty in disposing of the northern hare, which constitutes its principal food. Like all owls of the far north this species often hunts by day, and its eyes are small when compared with those of its relatives. Its large size and rather uniform grayish plumage, which is remarkably soft and loose, will serve to distinguish it from any other species. Its eggs are the largest laid by any of our owls, and the nest is an open one usually high up in a conifer.

One of the relatively common small owls of the great transcontinental forest, but one which rarely comes into the United States, was happily named after the great naturalist who did so much for northern zoology—*Cryptoglaux funerea richardsoni*. In its chosen haunts of spruce and pine it is often heard in the long spring twilight serenading its mate, its musical notes betraying its relationship to our own more common friend, the saw-whet, but greatly exceeding that bird's efforts in variety and sweetness. In the deserted hole of a flicker or in a similar cavity, it rears the darker plumaged young. To the Nature loving camper in northern lands the experience of visiting with Richardson's owl is a treat worth a long journey, and one calculated to provoke the wish that this little haunter of the silences were more abundant and had a wider range.

The smallest owl of the north is *Cryptoglaux acadica*, generally called from its note the saw-whet owl. The ordinary note is a whistle, repeated at intervals of about three seconds, perhaps for several minutes at a time, that has such a scraping, metallic quality that one readily notes its resemblance to the sound made by filing a large saw, though few would actually be deceived by the note. Unless one follows up the source of this elusive sound, a notable feature of our northern spring, and actually detects the little singer on his perch, even the confirmed bird-lover may live for years in the haunts of this little night wanderer without knowing of his presence. Near the close of an April day, when the freshness of the newly-bared earth, eager to spring into greenness, sends out those delightful odors that seem intensified by the coolness that grows with the declining sun, the little saw-whet pours forth that series of love-notes whose strange quality has made them a commonplace in the written word, though not in every one's experience. We warrant that few will

ever forget their first meeting with this dainty little bird.

Following the courtship that this love strain presages, the little owls set up housekeeping in a tree hollow, usually the deserted hole of a flicker, and there raise the darker-plumaged young ones that differ so much from their parents in appearance that they were long supposed to represent a different species.

The little screech owl, *Otus asio*, is probably our commonest species and yet how little we know about him. Probably he was named because of his fancied resemblance to some European species, and the name sticks to him, though few have heard him screech. The books say his note is a "quavering call," or perhaps that he is misnamed, because he does not screech. Yet he screeches in the forest, if not in the books. To some earnest student, keen of hearing and apt at describing what he hears, there is no more fertile field for research than the study of the notes of our owls, and none of them, I believe, is more versatile than our little tufted friend. Hundreds of times has the voice of this night-hunter come to me from the forest depths, yet I must confess that I had heard screech owls for years before I heard one scream. Many times, however, usually in the stillness that comes after midnight, have I heard a series of musical screams, sometimes slightly tremu-

lous, and occasionally terminating with a rasping squeal. Sometimes the squealing or screeching may take on a querulous quality, and there may be either a rising or falling inflection at its close. On a few occasions the screech has been actually startling, and for a moment I have doubted its source, but always, if I listened intently, there would come a hint at least of the usual quavering call that is so characteristic, and that in most accounts of the bird is the only note mentioned.

Thoreau found only dolefulness in the voice of this little owl and so the notes have impressed many observers, but to me his quaver is a cheerful sound. After all, it is no concern of ours, for he is calling to his mate, and there exists no evidence that for her it carries anything but sweetness. But our singer does not appeal to us by voice alone for he is one of the night watchmen who guard our property. Most of his food consists of the mice that ravage our fields. Sometimes, it is true, the demands of the nestlings may drive the parents to take toll of their lesser feathered neighbors. But I have a friend living in a community that boasts one of the densest small bird populations in the country, whose yard has held for many years a pair of nesting screech owls, and where vireos and thrushes and sparrows rear their broods in peace.

In most parts of the country this owl appears in two color-phases, red and gray, and even in an intermediate hue. The nest is in a hollow tree, and the newly-hatched young are pure white, and closely resemble young chickens.

The flammulated screech owl, *Otus flammeolus*, is a bird of the highlands of Mexico and Central America, and in our western states is a rather uncommon resident north to southern British Columbia. It is smaller than the common screech owl, and like it, is found in both the

(Continued on page 188)



WILD ROSE WINS

Sweeping Victory Is Gained
over Columbine

THE CHOICE OF THE PEOPLE
*In a nation-wide election which spread
over thirteen months, this flower de-
cisively defeated a select field*



E. L. CRANDALL

THE wild rose is the national flower. So the citizens of the United States have voted in the American Nature Association campaign which ended December 31, 1929.

Rolling up a total of 492,811 votes out of the 1,067,676 votes cast, it gained a plurality of more than 230,000 votes over the columbine, the nearest contender. It captured every state except Colorado, Florida, Illinois, Minnesota, Massachusetts, Vermont and Washington. With practically no "campaign committee" in any state, and with a number of organizations actively trying to defeat it, it withstood every assault upon the lead gained early in the campaign.

The columbine, supported vigorously by the newly organized Columbine Society during the last days of the referendum, had 261,451 backers, who threatened, during early December, to sweep the rose under with a flood of votes. When the contest closed, however, the leader was still gaining.

How decisive was the choice of the people is indicated by the standing of the seven other leading candidates, shown in the table on page 184. More than 65 percent of the vote was divided between the two leaders and there is no question of these being the national favorites. The violet, goldenrod, American Beauty rose, phlox, daisy, dogwood and mountain laurel, which finished in the order listed, never had a chance of victory. All other flowers, grouped under "scattering," received but three and one-half percent of the total.

The wishes of the people will be translated into legislative form—Congress willing—as soon as possible. It is understood that a bill for the columbine is likewise to be introduced by the Columbine Society.

The National Flower Cam-

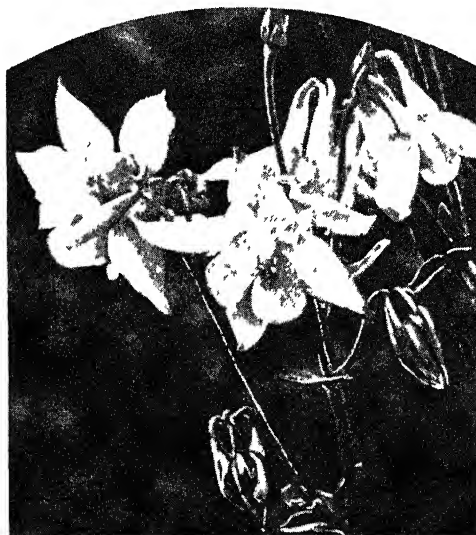
paign was begun late in 1928, first to engender an interest and love for wild flowers, secondly, to promote their conservation, and thirdly, to direct attention to Nature generally. The Association had no candidate. It likewise felt that though a National Flower should be chosen, its choice was secondary to the other interests involved.

The referendum has been eminently successful. A large proportion of school children voted, along lines suggested by the Association, in such a manner that there is no question of the benefit they derived. A typical campaign is the one conducted by the Franklin Junior High School of Green Bay, Wisconsin, where all the state flowers and candidates were illustrated on the school bulletin board, and discussion preceded the actual voting by a month.

Educators, who assisted the voting in more than a dozen states, have asserted that the campaign has fostered citizenship, by giving the school children opportunity to vote in a National event. It also created knowledge of history and Nature, both of which had to be studied to arrive at an intelligent opinion.

While the tracing of adult education is much more difficult, the Association feels confident that the interest expressed through the votes was not merely for the moment. In more than thirty commonwealths, state-wide campaigns were conducted by local organizations. The Garden Club of America, the Daughters of the American Revolution, the General Federation of Women's Clubs, the State and National organizations of Camp Fire Girls and Girl Scouts, the Columbine Society, Nature Clubs and conservation groups scattered over the entire nation all took a significant part.

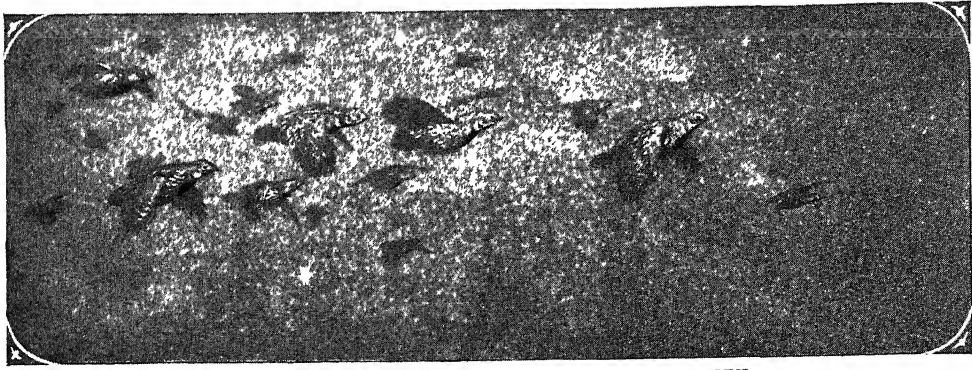
(Continued on page 184)



E. L. CRANDALL

THE COLUMBINE WAS RUNNER-UP

While it did not run a close race with the rose, it was far ahead of the violet and golden-rod, third and fourth place winners.



"A TINY RAIN-QUAIL WINGED HIS HAPPY WAY WITH
A GREAT HOST OF HIS FEATHERED FRIENDS"

THE LAST FIGHT of the INDIAN RAIN-QUAIL

by R. H. Ashby

Illustrated by R. Bruce Horsfall

THERE was no wind. The palm trees stood up straight and tall and stiffly under a sky of cloudless blue. Through the close-matted foliage of overhanging peepul trees sunlight filtered, splashing the smoke-stained walls of Keonta village nestling in the shade.

Soft, twittering voices of women gossiping in the open, the tinkling bangles of girls at the well, the cooing of doves on the housetops, the chime of a distant temple bell mingled soothingly in a peaceful quietude.

Only in the house of Taj Khan, the headman of the village, was there consternation. Here, as befitting his dignity, he sat on a wooden platform, while a crowd of excited villagers squatted around on mats in all eagerness to witness the day's match between the village champion rain-quail, and a stranger bird belonging to Karim, the crafty money-lender from the great city across the plains. It was to be a crucial, even an epochal battle.

"Kana", the pride of the village, was just a common little, black-breasted, bob-tailed rain-quail of no special breeding, rather resembling a dwarfed half-sized partridge. A year since, while feeding in the low-lying millet fields on the outskirts of the village, he had fallen into the cunningly-laid trap of the bird-snarer

There had been a vain struggle within the net and then he had been rudely thrust into a net-covered basket where to his astonishment he had found himself with a number of his feathered friends—prisoners.

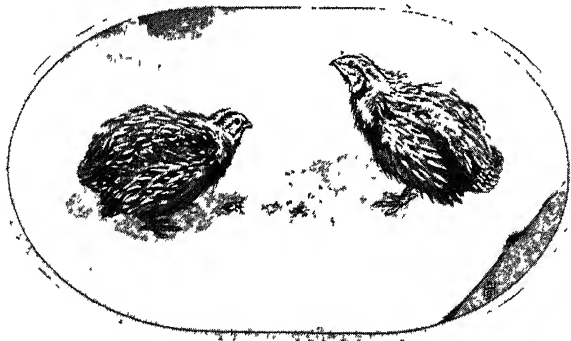
That day he had been taken to the dusty and noisy bazaar and offered for sale and bought by Taj Khan for a few annas, in the hope that he would turn out well. Nobly had the quaint-looking fellow justified his purchaser's expectations, and rigorous had been his training in the hands of Taj Khan, who was well

versed in the ancient secret practices of the quail fanciers, handed down since the days of the Moghul rulers of Delhi in training birds for their beloved sport. Much had the little rain-quail suffered in his period of preparation for this fight with the money-lender's bird.

According to immemorial custom, India through, he had been dieted strictly on molasses and spice pills, to-

gether with a small ration of grain. Tonics made of astringent herbs, mixed to form a lotion, were freely rubbed all over him to harden his flesh, while a special rage-developing treatment was inflicted to make him fight with a will.

This particular portion of his daily drill being considered in India as essential to the prize-fighting rain-



THE YELLOW FIGHTING CLOTH WAS SPREAD. A FEW
GRAINS SPRINKLED IN THE RING

quail as sparring is to the boxing puglist of the western world, took the form of constant teasing whenever the hungry bird was given his grain

Taj Khan would put the millet in his left hand, offer it to "Kana" at a distance, but upon the tame little fellow advancing in eagerness to feed, his right hand, swathed in protecting cloth, would be brought down upon the grain time after time, until by constant teasing "Kana" would lose his temper and rush at the obstructing hand, pecking and fighting furiously till exhausted. Then when he could fight no more, he was allowed to eat the well-won prize in peace.

"Kana" soon realized that the only way to get the grain was to attack it. So whenever anything, bird or hand, thereafter interposed itself between the grain-quail and his grain, there was a fight.

Under a period of this treatment, "Kana" improved rapidly and in a short time had met and vanquished all the local feathered fighters to the entire satisfaction of Taj Khan, who, confident of his bird's prowess, had arranged this match and moreover had laid wagers with those of his confreres who wished for the added thrill of a gamble.

The gray-bearded money-lender and his friends had also backed their bird heavily and smiled with the contempt of city folk at the excited babbling of the village worthies. They, too, had their secret ways of schooling quails for the fight,—methods, they considered, that would beat those of rustic simpletons and village cultivators.

At last all was ready, the bets were arranged and the village patriarch, in his capacity of referee, spread the yellow fighting cloth on the ground, sprinkling a few seeds of grain in the centre of the ring he paused impressively for a few seconds and then gave the word to commence. The birds were shaken from their cloth bags in which they had been confined, and placed at opposite ends of the cloth.

They had been left without food the previous day and in their hunger they both darted at the grain only to meet the maddening obstacle which their rage-inducing treatment had made them so familiar with.

For a few seconds the combatants halted, stiffened themselves and glared at each other. Then "Kana" drew himself up to his full height and advanced a step majestically, his round, red, malicious eyes fixed upon his foe, his black breast expanding with indignation at the stranger's presumption, his short, rounded wings quivering, his stumpy little russet tail spread, his smooth head bobbing with extreme alertness, on the lookout for the very least movement of his enemy.

Suddenly there was a rush, they met in mid-air like

fighting cocks. Feathers flew. Both being birds of proved ability, the match was expected to last at least thirty minutes, before the fighters acknowledged defeat in the regulation quail manner by turning tail and flying off the cloth.

"Kana", quick as a flash of light, sprang at the other beast. Just as quickly, indeed, came down the stroke of his terrific beak on his opponent's head, then before the blow could be repeated he seemed to falter and retreat wildly before the stranger's pursuit. Urged on by the astonished Taj Khan's oaths, "Kana" rushed once again at his enemy, but again gave way almost before he touched him. He seemed to be afraid.



"... CAME DOWN THE STROKE OF HIS TERRIFIC BEAK
ON HIS OPPONENT'S HEAD"

Panic prevailed, the crowd jeered and groaned, the money-lender looked on and smiled, while "Kana" dodged uncertainly about the arena, and in a disgracingly short time acknowledged defeat by flying away over the spectators' heads and alighting some distance down the road.

The noise was deafening. Taj Khan almost foamed with rage, and in his fury of disappointment lifted a brick and hurled it at the

vanquished warrior, then with a scowl turned to argue his debts before venturing to catch his bird and push it back into its bag.

After being recaptured "Kana" would not be permitted to fight again, indeed, he would be fattened for the cooking-pot. No chances would be given him for he had learnt the sweets of laziness and would in all probability always retreat rather than fight in future.

"Kana" was ignorant of his fate, nor did he much resent the stone that Taj Khan threw. For the tiny bird was at the moment suffering torture caused by the finely-powdered chilli seed which had blown into his eyes and mouth at the first blow he had given his opponent.

Practicing an ancient cheating ruse sometimes used by scoundrels among the Oriental bird training fraternity, the money-lender had sprinkled his bird's feathers with chilli powder in such a manner that it would not inconvenience his own quail but incapacitate his opponent. This dastardly trick had worked and lost "Kana" the fight, but it had an unlooked-for result now. Dazed with pain and thirst which were intensified by the sun's glare, the poor bird crept miserably aside into the shelter of some bushes by the side of the road. He lay still for a while in his place of concealment, while Nature exerted all her efforts to slowly unravel in the coils of his brains the memory of safe resting places and secluded feeding grounds in the vicinity of a pool a mile distant.

After a while he emerged from his hiding place and made a few short, rapid quail flights in the direction of a group of mango trees, alighting in the thick grass

and rushes fringing the cool and shaded water-side

Here he lay so still among the undergrowth, his protective coloring camouflaging with the surroundings so like the dried weeds and the mud, that even the gamboling field-mice did not discover him until they tumbled against what they mistook for a clod of sun-baked mud, and a pair of horned owls crooned in a branch above without noticing him, their gentle murmurings soothing his weary senses after the hubbub of the village and the shouts of the villagers. After a while he ventured cautiously down to the water's edge and relieved his burning eyes and throat of the remaining chill: powder. Then he returned to the grateful shelter of the reeds and feasted on the myriads of luscious grubs and caterpillars he found there, taking a keen interest meanwhile in the teeming bird life about him.

Just before night fell a great regiment of bar-headed geese lead by a wise old gander in its V-shaped array passed straight overhead on one of those mysterious journeys towards the setting sun, which shone red as a ball of live coal through the rain-filled clouds. Night fell swiftly, for in India there is but little twilight, and when the first croaking of the bull frogs caught his ear, he rose from his covert, listened awhile to the faint sleepy quacking of the teal and the splashing of water off webbed feet, then, finding all was safe, he revelled in all the night doings of a free, wild quail once more, for being nocturnal birds, quails live their days when all is dark to man.

First he indulged in a sand bath; then he attended

to his toilet, spending a considerable time preening his plumage until the feathers of his wings and tail were arranged to his complete satisfaction.

Presently, however, he grew restless. He felt a strange desire down in his heart for companionship. He stood erect, gazing up at the soft sky overhead as if expecting some summons, when his ear caught the sound of many tiny wings overhead, a sound that stirred some dormant memory and set his very soul quivering with a strange desire to join the passing birds.

As he was gathering himself for flight, they abruptly swooped, and in an instant the water-side all about him was thick with rain-quails alighted there for a brief rest on their monsoon migration from the low-lying districts to the drier parts of the United Provinces.

That night, the grey beards of the village gathered under the peepul tree, the hookah was passed around and under the influence of smoke Taj Khan waxed vehement.

"Brothers," said he, "Dire disgrace has fallen upon this village. We have searched the roadside till we were tired men. Never has it been known that a beaten quail failed to return for his punishment."

His listeners wagged their heads, and with one voice exclaimed, "May the jackals feast on him tonight!"

Fate decreed otherwise, for as these words were uttered, high up in the dark sapphire sky, lit by the stars, a tiny rain-quail winged his happy way with a host of his kind to the distant uplands of the North.

Marauders of the Fish Pool

THE humble fish have enemies just as troublesome as the cat is to the bird, and one of the worst is the giant water bug, called by some electric light bugs because the adults seem to be attracted to bright lights. This peculiar type is capable of living both in and out of the water, which is the reason for its appearance in many pools in a small neighborhood. The species pictured here is known as the Zaitha and belongs to the family Belostomidae. It is over an inch long, of a dark brown color, oval shape, and has two rather broad hind legs, a sharp short beak, and two clasping front legs. Concealing itself in the mud at the bottom of the pool, it awaits the unsuspecting fish. With

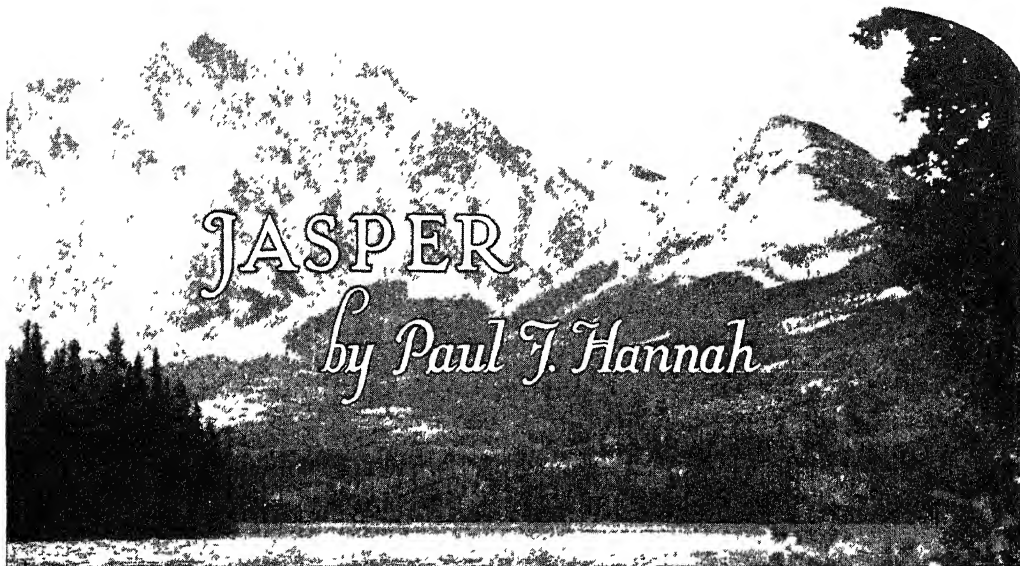


They Discourage Fish Growers

by Edna Betts Trask

great swiftness, it darts out and attacks its prey by clasping its sharp forelegs around the fish, sucking the blood from its neck. The Zaitha does most of its damage during the season when the fish are spawning and makes it very discouraging to the owner of the pool who is always so enthusiastic over the increase of his fish.

One of the most interesting habits of this bug is the manner in which the eggs are cared for. The female lays her eggs on the back of the male, fastening them with a layer of waterproof glue—much to the displeasure of the prospective parent. Often, this duty of nurse-maid so irritates the male bug that he hides himself for days, until the eggs hatch.



WE STOOD at the foot of Angel Glacier, directly under the towering ramparts of Mt Edith Cavell, on a cold, wet September day. Mists shrouded the shoulders of the great peak above us, just as they had blotted out the distant horizon along the twelve mile ride from Jasper Lodge.

Steam rose from the rocks lying on the glacier's surface. The rain blew in our faces, it froze on our gloves—still we stood there, as if entranced. He was the first to speak, and his voice contained all the hopelessness of a man who sees great riches before him and realizes that he cannot take even a small share.

"And this is but one of the glories of Jasper! To think that there are over five thousand square miles of them in the Park!"

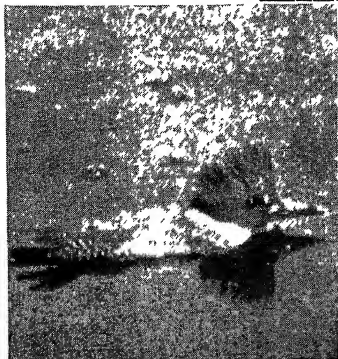
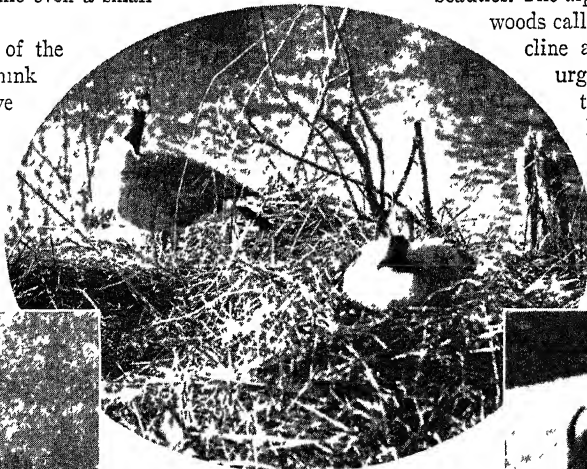
His was the feeling of nearly every one of the twelve thousand people who yearly

Jasper National Park, Canada, has been added by the American Nature Association as one of the objectives of its Nature parties, lending itself particularly by its wildness to these particular types of visits. "On Western Trails", is the title of the booklet describing the 1930 trips and it will be mailed to all interested. It is well worth considering in making your vacation plans.

visit Canada's greatest preserve. When such wonders are opened up before them, how can they choose but a few, and leave the rest unexplored? The beautiful Athabaska Valley and its gigantic peaks and great sprawling lowlands, the Tonquin country, magnificent in its unexplored

Ramparts; the Columbian Icefield and headquarters of the North Saskatchewan River, containing one of the largest icesheets south of the Arctic—each section has an appeal that can hardly be denied. Yet one summer, and even two or three, are not enough to drink in all their beauties. The alpine meadows and the deep

woods call to the botanist, each syncline and bank of boulder clay urges the geologist to linger to explore the Record of the Rocks; the bird and animal life that abounds in the park, that has become the largest wild life refuge in the world, has a way of luring the



TO BE FOUND IN JASPER

A pair of Canada geese nest along a lake, while a king-fisher and a mountain goat, both park denizens, look on

visitor to the exclusion of nearly everything else. And there is never enough time to take in them all.

The land of "magnificent distances" is Jasper. The great mountain ranges, remnants of ancient seabottoms hoisted skyward by the gigantic forces creating the Rocky moun-

THE FRIENDLY POSEUR

The black bear is the garbage-glutton in Jasper as elsewhere



CANADIAN NATIONAL RAILWAYS

ernment, that, profiting by the example of the United States, has set aside great tracts in the untouched Canadian Northwest for the eternal preservation of the natural wilderness. Its 5,380 square miles comprise more than half the total area of Canadian preserves and form a major part of a great chain of "open spaces" that extend straight north for three hundred unbroken miles from the southern tip of Banff National Park and reaches out to include the foothills both east and west of the Rockies. Jasper adjoins Mt. Robson National Park on the Alberta-British Columbia Boundary.



tain, run from northwest to southeast, and cutting across them, frustrating the attempts of the peaks to dominate the land, lie three beautiful valleys—the famous Athabaska, the Brazeau and the North Saskatchewan. Time has carved great meadows and rolling hills; glaciers have added symmetry and curve, to create a simple grandeur with perfect proportion of mountain, lowland and water. There is a touch of the freedom of the plains in Jasper which relieves the harshness of endless miles of naked summits and serrated ridges. And the brilliantly colored lakes—some opaquely green, some amethyst, some a thousand shades at once, form the jewels for which the mountains and valleys are but settings.

Jasper is primarily a monument to the foresight of the Canadian Gov-



KILROY HARRIS

MALIGNE LAKE

As beautiful in its way as its dainty calypso, the orchid of deep glens

line and Rocky Mountains Park at the south. In the entire region wild life is inviolate, forests are to be preserved, and, though highways to open the section will be built, the pony and pack train will continue for years to be the principal mode of locomotion.

This wilderness, broken only by the twin razor edges of the Canadian National railroad, which alone open it to the world, has played almost a lead-

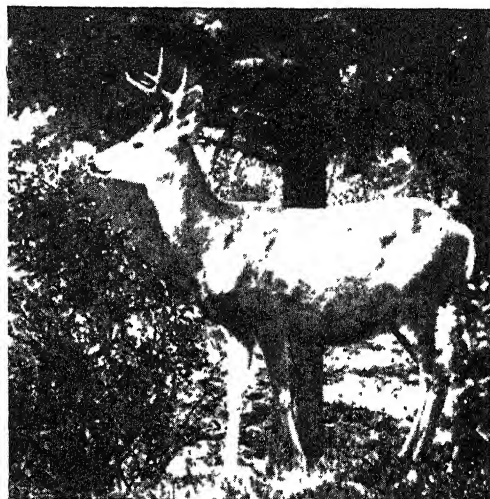
IN JASPER IS SANCTUARY
Both the ptarmigan and deer are increasing rapidly in the Park. Savage-mouthed rainbow trout, however, are still legitimate prey.



CANADIAN NATIONAL RYS

ing rôle in the building of the Canadian Northwest. Four waves of pioneers tramped along the rushing Athabaska, seeking the natural gateway through the Rockies to subdue the rugged Nature of a rich land. The fur-traders, with their burdens of pelts, representing the first harvest from the centuries of undisturbed wild life propagation, were the first to follow David Thompson, who discovered Athabaska Pass in 1810, then came the scientific explorers, trying to understand the endless variety of Nature in this new land—and among them David Douglas, godfather to the Douglas fir, who on one occasion packed 43 pounds of precious seed on his back and brought them over the Continental Divide. The rush of gold-seekers in the middle of the century was doomed to disappointment and in many cases, death, but the railroaders, racing for a route to link Pacific and Atlantic, found their dreams realized in Yellowhead and Athabaska passes. In 1909 came the first rails, and these alone have survived a greedy Nature that is bent on conquering all signs of man's coming. Now the tourists have found the land, to rejoice in its wildness and its endless charm.

The picturesque cavalcades of fur-traders found, when they roamed the Athabaska country, a superabundance of animal life, but excessive hunting and trapping—not for sport, but for sustenance—gradually drove the wild life away from the trails. When the Park was created in 1909, continued Indian hunting had sadly depleted the furbearers and big game. Since that time, however, with-



CANADIAN NATIONAL RAILWAYS

in the closely guarded boundaries of the preserve, animal life has been coming back. Bear, sheep, goat and deer are found everywhere, quite frankly curious about men, and unafraid. A herd of over 100 goats live precariously on Boule Roche, and nearly 10,000 others range from Pochontas to Athabaska Falls, along the north fork of the Snake Indian River and in the Maligne and Medicine Lake Valleys. Silver tips and black bears call the country their own. Elk are so tame as to wander close to Jasper Lodge, although their usual stamping ground is the Maligne range and the upper Athabaska. Moose abound in the willow and aspen groves, driven to sanctuary by shooting in the country to the east. Caribou, mountain representatives of an arctic race, are found in two regions—the Snake Indian and the Tonquin Valleys. The furbearers,—mink, marten, otter, and fisher,—are recovering from the depredations which marked the nineteenth century. Every lake, nearly, boasts of its quota of beaver, and two lodges are in plain sight of the highway at the northern end of Lac Beauvert.

Marmots whistle from every rocky patch, and peer above the friendly boulders to watch the traveller pass. "Haymakers" or pikas continue their harvesting under overhanging rocks. Several varieties of squirrels and chipmunks and many smaller species represent the small mammal population, and grow fat along the trails from bribes offered in exchange of a pose or two.

The predatory animals are restricted to a few wolves in the northern section, the beautiful lynx, periodically numerous, and many coyotes. The balance of Nature, so often upset in American Parks,

TWO OF THE PARK FAVORITES

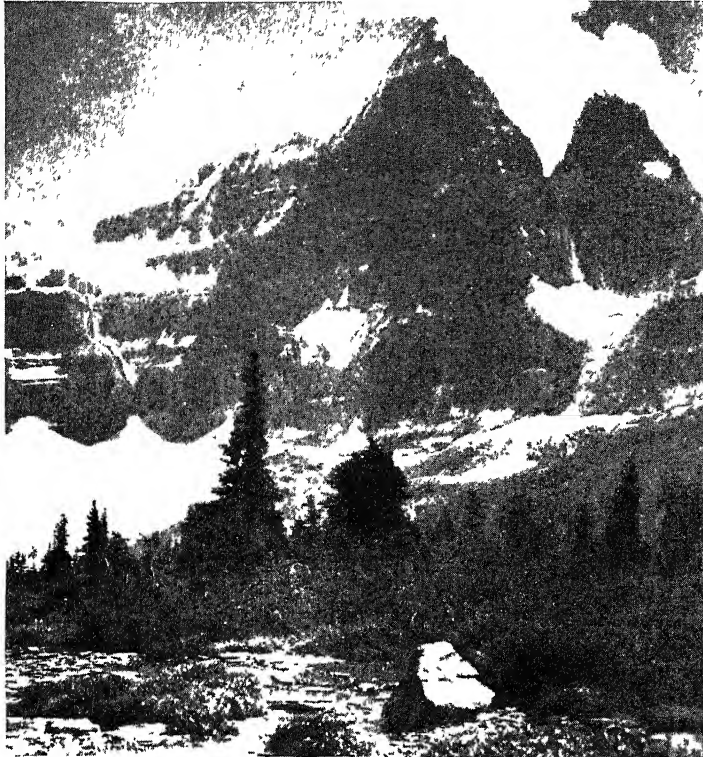
The giant carpets of pink heather make the beauty of the alpine meadows. Friend whiskey-jack is the Park alarm clock.



CANADIAN NATIONAL RYS



ASAHEL CURTIS



CANADIAN NATIONAL RAILWAYS

MOUNT COLUMBIA

The second highest peak in the main range of Rockies, and the highest in Jasper Park.

precarious frigid homes in the rocks.

Tree life is not prominent in Jasper, it is too far north and too high in altitude, but all the representatives of the Canadian and Alpine zones are there, among them the jack pine, Engelmann spruce, fir and other evergreens. Great groves of timber dot the valleys, but as the trees give up the struggle at 6,000 feet, much of the park is naked rock, or else given over to hardy shrubs and herbaceous plants.

There are but three geologic periods not represented by outcroppings of rock in Jasper, and it has been a mecca for geologists ever since it was known. This home of the Columbian Icefield and several hundred lesser glaciers gives marvellous opportunity for glacier study, and the sharply-cut cliffs and canyons present unexcelled examples of the twisting and turning of rock strata. You will see in Jasper, among thousands of other things, the ripple marks of stranded beaches 8,000 feet above the sea, marking the spot where once the tides of ancient oceans

is little changed in Jasper. Man has not yet had time.

The task of surveying to completion the plant life of Jasper still remains, although the Tonquin Valley and Mount Edith Cavell region has been quite thoroughly canvassed. One does not need to be a botanist to appreciate, however, the alpine gardens and the flower-strewn slopes in spring. April has hardly opened in the Athabaska valley before white anemones and yellow snow-lilies are racing the retreating snow up the hillsides, to give way in their turn to Philadelphia lilies and wild rose. Gaillardias line the open trails, which, when they turn to wind among deeper woods, disclose twinflowers and white queen-cups. The snow-flowered dryas covers many a gravelly patch of ground. Red and yellow columbine abound, the calypso, fairy-winged, one of the most beautiful of mountain orchids, awaits the flower lover in the shady depths.

It is in the loftier meadows where the flower symphonies swell to most exquisite heights. Little Shovel Pass, on the usual tourist route, and Marmot Pass defy description when early summer comes to Jasper. Larkspurs, forget-me-nots, arnicas, paintbrushes—these flowers and a host of others cover the slopes. And even up beyond the treeline many delicate blooms,—moss campion, snowlilies, monkey flowers and a variety of heaths and herbs,—find

ebbed and flowed.

Birds are many and varied here. Grouse drum in the lowlands, and "foolhens" live up to their name. Whiskey jacks, or Canada jays, and chickadees keep the day noisy. The ospreys and eagles rule as monarchs of the crags. In the little mountain streams the water ouzel splashes, while the lakes afford a great population of water birds—the fantastic loons and grebe, goldeneyes, mergansers, mallards, butterballs, and a host of geese. Teals disturb the reflections of mountains as they float over the surface of the ponds. Owls of several species here hunt their murine prey, and the hawks haunt the hills. The ornithological record has yet to be completed, however, so one enters as an explorer, and leaves with the joys of many fresh discoveries.

Such, in too few words—and too prosaic ones—is Jasper. It is a Canadian treasure chest where are stored numberless wonders of Nature. And above all, it is Canada's generous answer to the call of the outdoor lovers of an entire continent, it is a solemn pledge that the wilderness of untold centuries, the wilderness of the pioneers, shall not be destroyed.



SHEEP ALONG THE TRAIL
Not an uncommon sight along the way in the greatest of Canadian preserves

CANADIAN NATIONAL RAILWAYS



THE PACK RAT, WITH STEALTHY STRIDE,
DEPARTS WITH HIS PLUNDER, WHILE
HUMANS SLEEP

THE FREE TRADER of the WEST

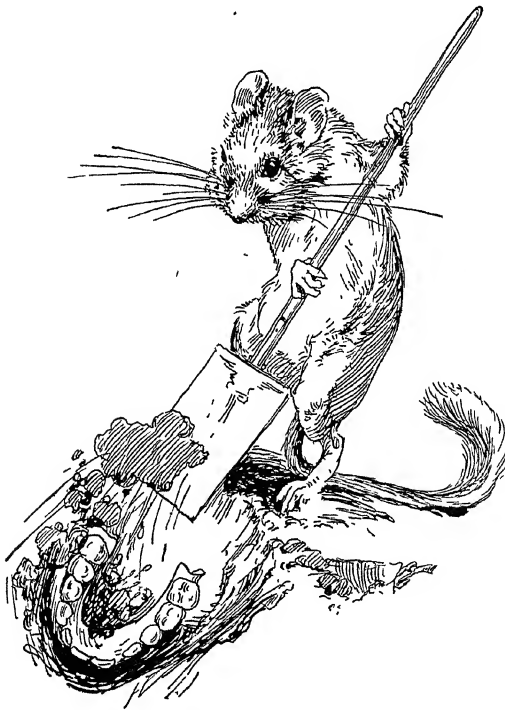
He Swaps and Swaps, and Always Wins

by Dan McCowan

Illustrations by R. Bruce Horsfall

IT didn't take him long to find us. We had hardly moved into our camp about fifty miles south of Lake Louise when he let us know he was around, by swapping a spoon for a pine cone, then he borrowed a tin cup, and left us a stick for security. During the first night, we could hear him poking about under the cabin floor in his sociable way. His hind feet went "tap tap tap" on the hard pine boards. Our friend, the banker, from Montreal, who was taking his first pilgrimage to what he smirkingly called "God's Country", fidgeted and jumped, and suggested ghosts and haunted houses and Conan Doyle, but Joe, the half breed, snorted contemptuously. "Huh, no banshee here. Only pack rat. Him moved in."

Then, next morning, the clean-looking little fellow with the grey fur wrap and



THE PRACTICAL JOKER CAREFULLY
BURIED THE BANKER'S MOLARS

the impertinent busy tail caused a war in our peaceful, happy camp. Our banker had lost his false teeth. He had placed them beside his bed, he roared, and he stalked up and down the cabin mumbling threats of violence against the individual whose misguided sense of humor had caused him to replace his dental necessities with the skull of a squirrel. He kept eyeing the grinning Joe, and it was almost evening before the woods-wise guide really saw the seriousness of such rage, and led the way to a nearby rat "museum", where amid the bric-a-brac of many robberies, the pack rat had placed the missing molars. Whereupon our friend called on the Bank of Montreal, the U. S. Federal Reserve System and the Canadian Mounted to exterminate this practical joker of the western forests and hills.

It would be hard to remove

the activities of the pack rat, however, from the western regions. While not abundant, he is evenly distributed, and each year he has several litters of young in the soft grass and hair nests with their bulwarks of twigs, reed roots and cactus burrs. Of course his enemies are legion—hawks, owls and eagles attack from the air, while wild cats, weasels and the coyotes are eager to pounce upon him—but he is quick, and intelligent, and his prominent, bright eyes see everything. Since the epidermis of his tail is loosely attached, a good many times his life has been saved by the skin thereof. Man hardly molests him. The wranglers and rangers seem to appreciate—with

limitations—his unconscious practical joking and his robberies. He has no economic value, and though he will nibble corn, potatoes and some grain, he is no bother. Perhaps his sociable qualities keep his ranks filled—for he prefers human surroundings, where the wilder animals do not come,

and every inhabited cabin has a family under the floor. He does not hibernate during the winter, but lives on his store of nuts, roots and fruits collected with his well-known pack habits.

The "trader", or "pack", or "mountain" rat is really

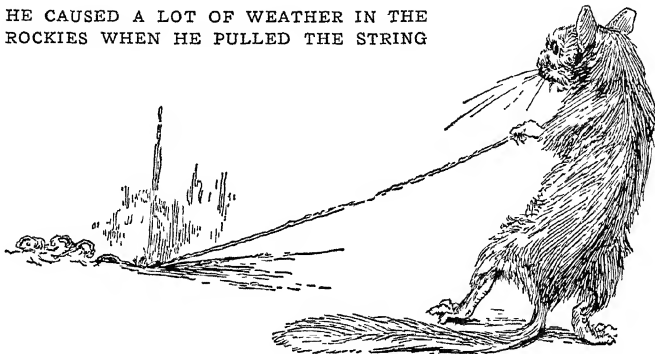
a wood rat, who has adapted himself to life in the frozen wilderness of the sub-arctic as well as to that of the semi-tropic deserts of the South.

There is a meteorological observatory situated on the summit of a high mountain in the Rockies. The instruments, all of the self-recording type, are visited only once in a while. One day, a new weather-clerk who had been sent out returned to his station with his eyes popping out, and gasped that the weather had just gone crazy. His superiors examined the thermograph charts—the temperature had fluctuated violently from between forty below to the boiling point during

the past four days. Consternation reigned. Investigations worthy of the Senate started. Then it was found that a loose piece of string had been pulled off a shelf by an acquisitive pack rat, who had entered the bureau for reasons of his own. In going out, the string had caught in a crack in the thermograph

case. Every time the rat pulled on the cord, he moved the delicate needle. For four days he struggled for the possession of the string, while the temperature, to all appearances, grew hot and then cold. Persistence has the pack rat—that, and an affection for bargains.

HE CAUSED A LOT OF WEATHER IN THE ROCKIES WHEN HE PULLED THE STRING



Going, Going,

Gone!

THE CONTEST this time was not between a bullfrog and a bulldog, but one in which old basso profundo and a leopard frog were on opposites of the question. It matters little whether the spotted son of *Rana* called the other a "green old water fool", or whether he merely looked like a good meal—the result was the same.

The argument was won by the bull on the last swallow. Neither of the creatures look very pleased, however, in the pictures here shown.



ONE, TWO, THREE
Above, primary manoeuvres in leopard frog swallowing



The Sad Case of
the Leopard Frog

by Al Friedland

The gastronomic feat took place in my museum near Cold Spring, New York, and caused much philosophic speculation in the minds of those who saw it. Did the bullfrog know that he was swallowing his own cousin, that both of them were *Rana*, and the only difference between them was the difference between *catesbiana* and *pipiens*? Had he been brought up poorly in matters of dining etiquette? Was he deficient in zoology? The general conclusion, however, resolved itself into the following result:

"One bullfrog, full grown, but not able to swallow."

THE FINISHING TOUCH
"And that was the end of the frog, the frog."

WARS of

by C. T. Gregory

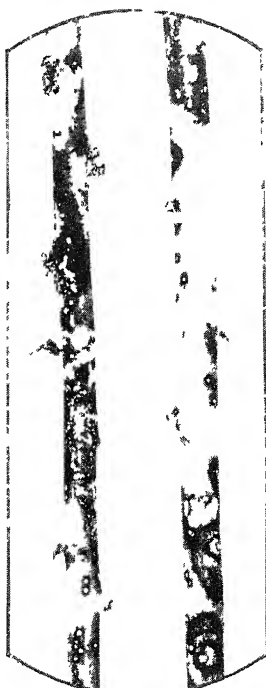
Purdue University Agricultural
Extension Department

WHEN I was a boy the rose bush never received much attention. It stood at the corner of the house and bore a profusion of blossoms in June which soon withered and lost their petals. No one ever gave it a thought except perhaps to slash off a branch that hung out too far and caught at our clothes with its multitude of thorns. And, through all this neglect and misuse the bush thrived, bearing its yearly crop of old fashioned roses.

Now, however, things are different. The rose has been refined and bred into a gorgeous flower with a long beautiful bud. With all this refining it would seem as if some of the sturdy hardiness of the old fashioned bush has gone. But, few of us would discard the new for the old. With all its weakness we love it more and must be ready to fight for it. We must save it from its invisible enemies, the fungi.

One of the most common of these diseases on all types of roses is the black spot disease. Black circular spots develop on the leaves. Sometimes there is only one large spot and again there may be numerous small ones, but in either case the leaf turns yellow and soon falls from the plant. Often the disease practically defoliates the bush.

The fungus causing black spots goes by the name of *Diplocarpon rosae*. During the summer when the



BROWN CANKERS

Appearing on the stems causing
purplish blotches

the ROSES

Battling the Beauties

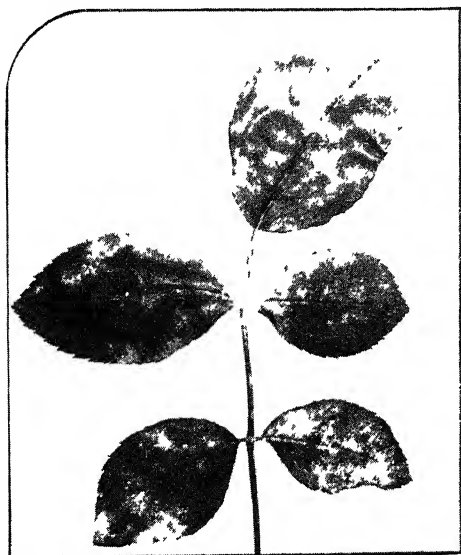
Fearsome Foes

weather is wet it spreads rapidly by the spores that are formed on the diseased leaves and blown by the wind. On the wet leaf the spores sprout and the germ tube grows down into the tissue, producing another spot. During every wet spell in summer this process is repeated. The infected leaves fall to the ground carrying the fungus with them.

This summer stage cannot withstand the dry cold weather of winter so a wonderful change takes place within these dead leaves on the ground. The fungus changes its habit of growth and produces another kind of cold resistant spores.

They are eight in number and are enclosed in tiny sacs embedded in the old rose leaves. In spring when the weather warms and the new rose leaves are again peeping forth from their winter buds, the fungus renews its activity. The winter spores are ejected from the sacs by hydrostatic pressure and once freed from the sac they are easily splashed or blown to the new leaves. They sprout there in a drop of water, enter the leaf and in ten days' time a new black spot has appeared. Again the fungus is ready for its summer of destruction to the rose leaves.

Way down South where it is summer all winter it is possible that the fungus does not need the winter stage. It may live as the summer stage. This makes the fight just that much more difficult but it is by no means

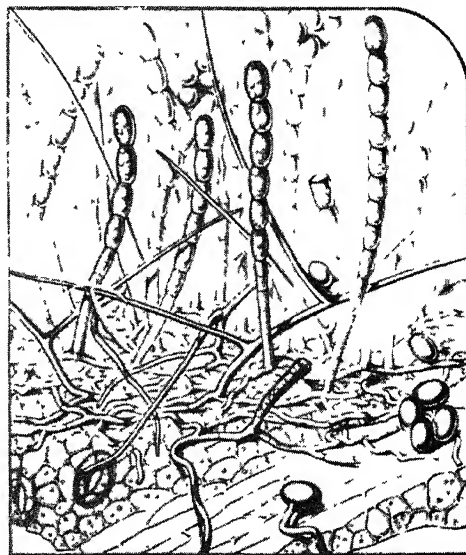


ROSE MILDEW

At the left One
fights it with sul-
phur dust from
spring to fall

HOW IT GROWS

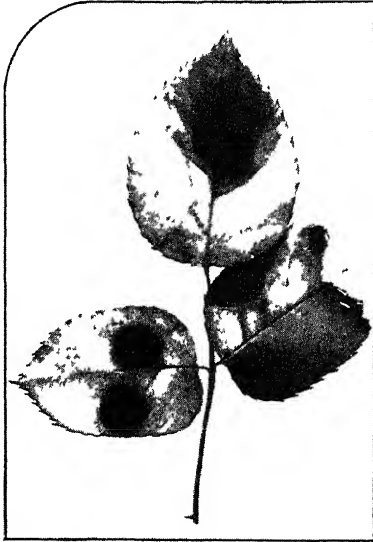
Mildew is a fun-
gus growing on
the surface of the
leaf



hopeless Surely science can find a way to check it

This is the way the fungus lives How shall we stop it? Not so difficult if we will consider the life of the fungus and fight accordingly First let us attack it in its winter quarters and rake and burn all the fallen rose leaves in autumn This will eliminate much of the danger but not all because remember this is a tiny plant and does not need much to live on Its necessities are few

BLACK SPOT
*The summer stage
of a virulent pest*



In spring and summer we must protect the leaves with sulphur dust This of course means the special dusting sulphur that has been ground exceedingly fine There is on the market a special rose dust that has been colored green so that it will not discolor the leaves Apply this dust every week or ten days during the spring when the weather is wet In summer if the weather is hot and dry it will not be necessary to dust so often, perhaps once every two or three weeks The dusting must continue in the autumn as late as October

Another common trouble of roses is the mildew, a disease that powders the leaves, buds and young stems with a white growth It will curl the leaves and blast the buds It is most serious on the climbing types of roses Ordinarily it is the first disease one notes

Mildew should cause no great concern to the grower if he will only be prepared with the sulphur dust As soon as the disease appears a few puffs of the dust gun will cover the vine with the sulphur and will effectually get rid of the trouble But let no one be deceived by the disappearance of the mildew,—it will reappear later on the new leaves The control is a matter of vigilance

The rose is also susceptible to several canker diseases Crown canker causes the death of the stems at the crown and may kill part or all the bush Brown canker attacks the leaves, flowers and stems, causing purplish dead areas Stem canker is another disease similar to brown canker but caused by a different fungus Watch for dead or dying branches of the bushes and cut out the diseased parts below the canker In cases of severe infestations these canker fungi can be held in check by spraying with ammonical copper carbonate from five to seven times during the season, beginning when the new growth starts in spring

The sulphur dust for roses may be mixed with lead arsenate or calcium arsenate and also with any nicotine

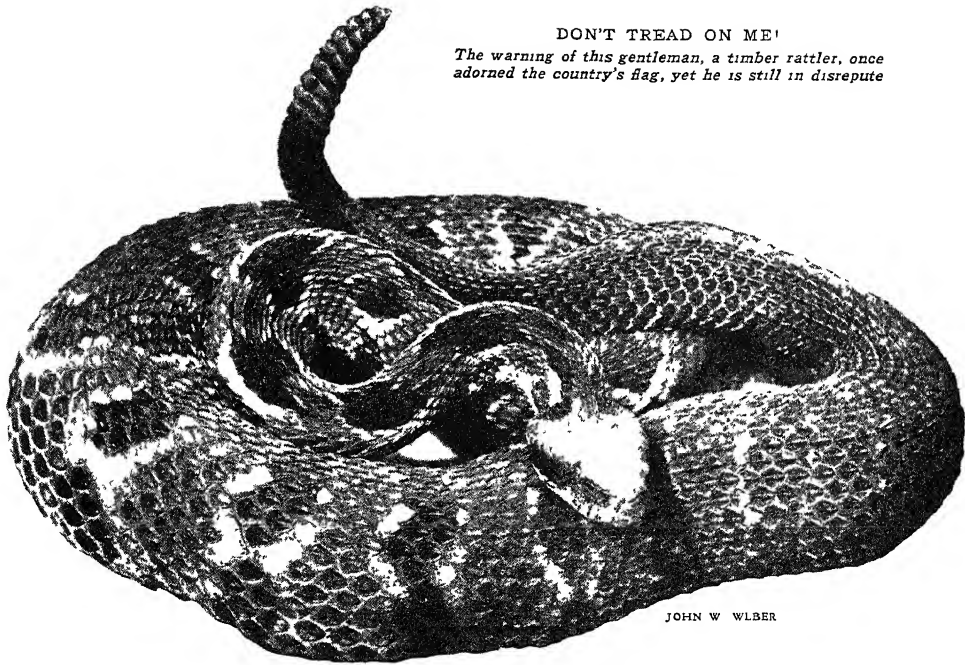


RUINED BUDS
*Rose mildew
struck them down
quickly*

preparation to control various leaf eating and sap sucking insects These include the slugs, red spider, lice and leaf hoppers When scale insects are serious on the rose bushes it may be necessary to cut and burn the most heavily infested canes A spray during the dormant season with any of the oil sprays will kill the scale Lime sulphur at the strength of one gallon in ten gallons of water is also effective but this spray should not be used near the house because lime sulphur blackens paint

Most roses need some protection against winter injury Ordinarily this simply consists in mounding the soil up about the stem to a height of ten inches and then covering lightly with straw Certain of the tender hybrid teas must be buried in a mound of soil or wrapped with straw The hybrid perpetuals, Rugosa and hybrid Rugosa, and moss roses are all hardy without protection

Spring and the rebirth of wild flowers and trees, the northward swing of the birds, the call of the open, are all expressed in the April issue of Nature Magazine Among the features of that issue will be stories on Bird Songs, John Burroughs, Skeezix, a White Coyote, the Peregrine Falcon, Spring Peepers and other stories of the springtime that causes snowbound life to awake once more



DON'T TREAD ON ME'

The warning of this gentleman, a timber rattler, once adorned the country's flag, yet he is still in disrepute

JOHN W. WILBER

THE HUMBLE WAY of the SNAKE

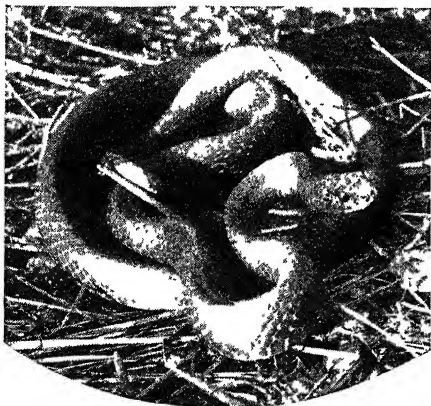
As Revealed by Photography That All May Practice

by L. W. Brownell

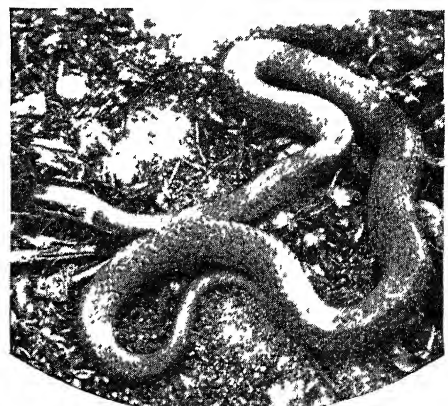
Photographs, Where Uncredited, by the Author

EVER since the snake was held responsible for man's expulsion from the Garden of Eden, no other animal has been so universally hated and feared. One reason probably lies in the fact that a number of the species are dangerously poisonous, and some are even deadly, but a still more potent reason is born in their stealthy manner of motion, and their silence. It is a heritage of man's primitive existence to fear that which moves without sound. And still this prejudice runs on through civilization, though in a great majority of instances, it is entirely without cause or real justification.

It is almost impossible to make a large majority of people believe that not all snakes are poisonous. I know, for I have tried it. I well remember seeing, some years ago, on a country road along which I was riding on a bicycle, a ring of half-a-dozen men and boys, diligently throwing stones at something in a fence corner. I dismounted to find out the cause of the excitement and discovered that the object of their animosity was a little garter snake about two feet long. None of them,—and four were grown men,—had the courage to face this little creature at a distance of less than ten feet. As they



RARELY POSING
The ring-necked snake at the right is very secretive, but when found is not hard to photograph



A BLACK SNAKE
A constrictor, forsooth, but quite harmless to man, who persecutes him

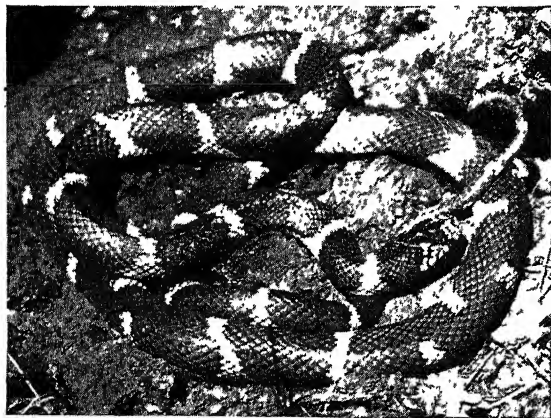
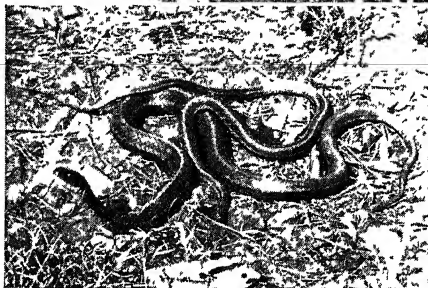
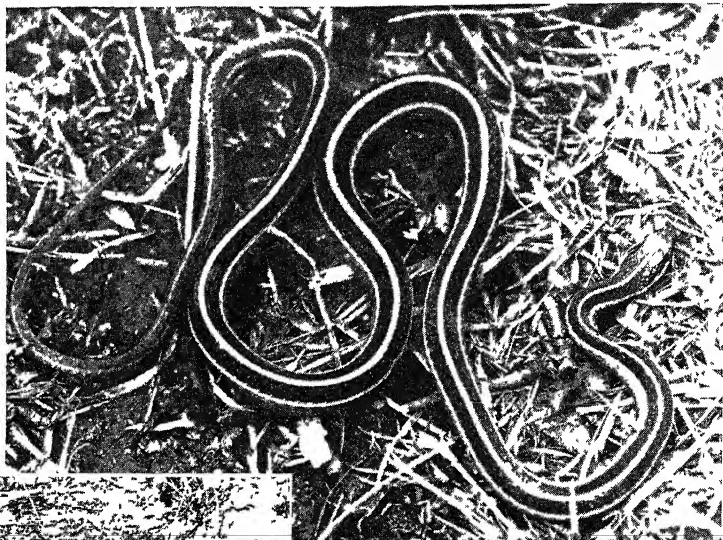
were exceedingly bad shots the little reptile, when I arrived, was laring not too badly. I will never forget the looks of utter horror and amazement with which they watched me as I picked up the little creature. Of course they shouted warnings at me not to go near it or it would surely kill me, and when I reached down to take it I am quite certain that they all expected to see me drop dead before their eyes. As I held it in my hands and walked toward them to try and convince them how really harmless it was they backed away as though they expected it to spring from my hands and attack

THE HANDSOME RIBBON SNAKE SIGNS HIS NAME

At the right a pair of harmless garter snakes bask in the sun

NO RATTLER'S POISON HARMS THE KING-SNAKE

The gentleman below is master in battle, while the grass snake, at the bottom, picks no quarrels at all



them, nor would they be persuaded that it was not a deadly creature. Even as I rode away, with the snake in my pocket, they shouted after me that it would certainly eventually bite and kill me, and I am positive that they really considered me a doomed man.

The belief exemplified by these men has been fostered from time immemorial by the great number of myths that surround these creatures. Among the more common of these concerns the "hoop snake" which forms a hoop of its body by taking its tail in its mouth and rolls after its intended victim with incredible velocity, according to the fairy story often told. This has a variation in some parts of the South wherein the snake eventually brings up against a cotton-wood tree which begins to fade within the hour, and in less than a day stands charred and black, poisoned by the frightful venom sent into its bark. Another figment of someone's vivid imagination is the "whip snake," having a sting on the end of its tail with which it strikes and kills its victims in much the same manner as one would use a quirt. Possibly this tale was evolved from the red-bellied or horn snake, a southern species with a spine on the end of its tail, which, however, is harmless. The hypnotizing effect of a snake's eye that will enable it to gain such control over its prey that they will fall easy victims, is quite a widespread and common myth, as is also the one that endows the snake with the power to eject a stream of poison from its mouth for a considerable distance. The one which makes of the snake a revengeful creature that will follow a person who has killed its mate until the opportunity offers for retaliation is, perhaps, not quite so well known but is, nevertheless, held in a stubborn belief by a large number of people.

The absolutely ridiculous articles that are allowed, from time to time, to creep into the news concerning these animals helps to keep alive the fear of them. Quite frequently I see in the daily papers such items as "Killed by the Bite of an Adder," "Terrible Fight with a Blacksnake," "Bitten by a Water Snake, Dies Horrible Death." Editors who publish such items would do

well to acquaint themselves with the habits of the snakes before making themselves the object of laughter to those who know, and giving misinformation to those who do not. Not so long ago I remember reading, in a New York paper, a long account of a woman in Colorado who fought a band of rattlesnakes for two hours and killed, if I remember rightly, two hundred and fifty of them, using nothing but a stick as a weapon. This on the face of it is manifestly ludicrous, for the article went on to say that the snakes attacked her in a band for no apparent reason which, incidentally, a snake never does under any circumstances. Moreover, if such a thing should, by the wildest stretch of imagination, ever happen, nobody, no matter how active he might be, could stand off such an attack single-handed without being badly bitten.

As a matter of fact the snake is more or less of a gentleman. His first instinct is to avoid mankind when possible and attend strictly to his own business when allowed. There are, unfortunately, altogether too many

Those of the South and Southwest often grow to a length of seven or eight feet and their "bite" is almost tantamount to a death warrant. The moccasin, that much feared reptile of the South, is a dweller of the swamps and morasses and, moreover, is so sluggish that one may step over him, as I have frequently done, without his showing any resentment. The copperhead, the rattlesnake's nearest relative, is distributed over the northeastern portion of the country and is nowhere common. Its "bite," while very unpleasant, is never fatal unless entirely disregarded. The fourth of the poisonous species is a comparatively small snake found in the far South and called the coral snake, because of its alternate bands of red, yellow and black. This is really a dangerous snake, related to the cobra, and its "bite" has been known, on several occasions, to cause death. Fortunately it is rare and, even more fortunately, it is hard to anger and may even be handled without fear of bad effects if one will but do so in a gentle manner. This I proved accidentally, and I have never since

ceased to be glad that it was a fact. Some years ago, when I knew little concerning snakes but thought I knew a great deal, I spent some months in the wilds of Florida on a collecting trip. One day I saw one of these little fellows directly in my path and, as I had always handled snakes

**NOTHING SO UGLY AND LESS
HARMFUL**

The water snake looks mean, but he will not attack

**JUST OUT OF THE EGG, AND
NOT DRY**

A few milk snakes survey the world for the first time

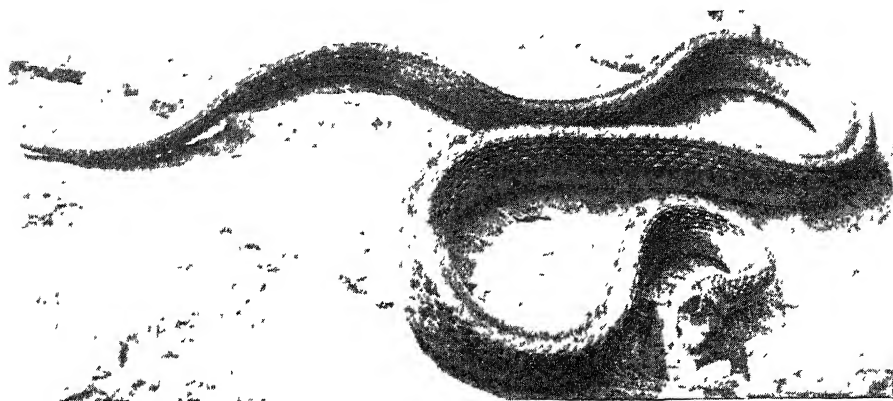


people who cannot see a snake without being attacked with an overwhelming desire to kill it. Any snake will show fight when forced to do so but it will always avoid battle when possible. Even the rattlesnake will give warning when too closely approached and will strike only as a last resort. It acts entirely on the defensive. In fact, it is capable of being handled with impunity if one does so in a gentle manner and with no show of fear. I cannot, however, go so far as to advise you to try the experiment.

Public sentiment to the contrary, it is a fact that, of all the species of snakes native to the United States, there are only four that are poisonous. To be sure the rattlesnake, the most dangerous of them, is divided into a number of varieties some of which may be found in every state in the Union. The northern rattler is comparatively small, rarely attaining a length of more than four feet. His "bite," while dangerous, is not necessarily deadly



LYNWOOD M. CHACE



ONE OF THE DWARFS
OF SNAKEDOM

*De Kay's snake is rarely
more than a foot in length*

and liked them, I picked it up and took it to camp with me thinking, of course, that it was a harmless species. There I kept it for more than a week, playing with it every day, until it finally escaped, and in all that time it never once turned on me or showed the least irritation. It was not until some time later that I learned that I had been handling a dangerous reptile.

Aside from any other considerations in their favor snakes are of considerable economic value as destroyers of rodents and insects. As such they should be protected instead of being persecuted by nearly everyone at every possible opportunity. The one and only real offence of which most snakes can be accused is the robbing of bird's nests, and this they will do whenever the opportunity presents itself.

As subjects for our cameras snakes prove to be most interesting and while their quickness of action makes them rather hard to pose successfully, still, with patience, one can accomplish much. Possibly the idea of posing anything so elusive as a snake may seem ridiculous to some, nevertheless, I can assure you that it can be done effectively although, it is true, they cannot be induced, under ordinary circumstances, to hold the pose very long. Snakes are characteristically long and slender and a photograph of one stretched at full length would greatly resemble a string laid on the ground. It is therefore necessary to make them assume some sort of a coil. This allows a nearer, and consequently, larger view and shows to the best advantage their natural grace of outline. It is not difficult to accomplish. First, one must never be afraid to handle his subjects. I have frequently succeeded in so quieting a subject by holding it gently but firmly and softly stroking it upon the head and neck that it would remain motionless in one spot for several min-

utes,—long enough for me to focus my camera and obtain a picture.

If another method is preferred, the following plan will always work if one but uses sufficient patience: set up and

focus your camera upon a certain piece of ground. Stop down your lens until you have a depth of focus that will give sharp definition over at least a foot of ground. Now mark the four sides of the spot wherein your subject must be in order to be in sharp focus, set your shutter, insert your plate holder and pull the slide ready for an exposure. Now herd your subject carefully into this space. This can be done with patience and after some experience by carefully guiding him with a stick. Never strike him. When the end of his tail is within one boundary, even though his head may be past the other one, strike the ground sharply with your stick directly in front of his nose. This will cause him to draw back into a fighting attitude, and he will usually hold this pose long enough for an exposure. If any part of his body should extend beyond your boundary marks you will have to try again until you get him where you wish him. Several of the accompanying photographs were made in this manner, noticeably those of the water and ribbon snakes.

This method is particularly effective with the poisonous species for it is easy to make them assume a defensive attitude and, this they will keep so long as you are just outside their striking range. One must be particularly careful, however, not to allow any portion of their body to come within this range, which is about one-third of



HE LIKES TO POSE FOR
THE CAMERA

*The hog-nosed snake is a big
bluff when in a battle*

their total length. An instant of carelessness will, almost certainly, result in being struck. The strike of a snake is probably the most rapid of any animal movement and it seldom fails to reach its objective.

The little hog-nosed snake, or puff adder as it is more commonly called, a picture of which appears on another page, is one of the easiest of all the snakes to photograph. In looks and actions he is, apparently, one of the most ferocious, but his actions belie his nature, which is gentle in the extreme. Small, rarely two feet in length, he is stockily built and, when excited or angry or in an attempt to defend himself from an enemy, he will flatten and distend his head and forepart of his body to almost twice its natural width, at the same time hissing so loudly that he can be heard at a considerable distance. His fierce demeanor is all bluff and though, in further carrying out this bluff, he will sometimes attempt a strike, he never actually does and it is next to impossible to force him to bite or take hold of anything with his mouth. He is, of course, harmless, for he secretes no poison and makes an interesting and amusing pet. When placed on the ground after handling he will assume any posture desired and keep it, usually for some time. In fact he will often go so far as to feign death, rolling over on his back and becoming perfectly rigid. Then we must wait until he comes to life again.

Of course, much better work can be done in the line of snake photography with much less expenditure of time and energy if one has an assistant. It must be one, however, who knows how, and is not afraid, to handle the subjects. Then he can do the posing while you attend strictly to the photographic end of the business. I once made some excellent photographs of a four foot black snake, one of which is reproduced with this article, with the aid of an assistant, which I never could have obtained alone, as the black snake is one of the quickest of all in his movements.

I do not want my readers to get the impression from what I have said that none of the snakes, except the poisonous species, will "bite." All of the larger snakes, with the single exception of the hog-nosed snake, may do so, but none but the poisonous species secrete any poison and their bite is not so much to be feared as that of the mosquito. I have known people to die from the bite of the latter but never from that of one of the harmless snakes.

The snake is a wonderful example of the effect of a bad reputation. His friends are helping him live it down, but the ancient prejudice exists. A few days with him as subject of your camera, however, will go far in convincing that his dangerousness is largely a myth and that after all, he is a gentleman in most respects.

THE CROW CLARK FOUND

by F. W. Schmoee



ONE evening not long ago I sat by my camp fire near the summit of a peak of the Cascade Range. Suddenly the restful stillness of the high places was broken by a cry. It was far from musical but it was cheery and pleasant for it was the call of an old friend of mine whom I had not seen for almost a year,—the Clark crow. A moment later the fellow dropped in on me. Dropped is a good word for that is just the way they arrive.

He is a large pearl-gray cousin to a crow with a heavy beak and wings that are black and white. His manner of flight is as peculiar as his call, a swooping, pitching, tumbling flight which takes him from alpine tree to alpine tree or from rocky crag to deep canyon with speed and safety if not with grace.

In the high country of the Northwest, where he makes his home, he is one of the most typical of our mountain birds. In the winter he has the range almost to himself for aside from him, the white-tailed ptarmigan, the rosy finch and the mountain chickadees are almost the only birds that care to brave the winter at timberline.

Although this bird, which should be called a nutcracker rather than a crow, was not actually named by Lewis and Clark, it was first discovered by them in the high passes of the Rocky Mountains and along the Columbia River and later named by Wilson in honor of the junior member of that well known expedition which made such notable discoveries.



THE BURNING OF THE FRUITS OF LABOR
The youthful campaigners watch the collection of
bagworms go up in smoke

BAGGING the BAGWORM

by Lena V. Feighner

This story of what the school children of Kansas City, Kansas, have done in warring against one insect enemy of their trees is presented in the hope that it may serve as inspiration and example elsewhere. Its author was the commander-in-chief of the troops

KANSAS is proud of her nearly three hundred millions of trees, some half million of which line the streets of her cities and towns. Her history is written in these trees and she will rally to protect them. In Kansas City there has been waging a war, in behalf of the trees, against their most destructive insect enemy in this vicinity—the bagworm.

The bagworm is characterized by the appearance of its larva which crawls about infested trees or swings from their branches on silken threads, in a baglike case, whence its common name of bagworm or basket worm. The insect undergoes all transformations in the shelter of these cases, after which the bags remain attached to the plants for some time and are conspicuous objects on leafless trees and shrubs in late autumn and winter seasons. The bags of the females in the meantime serve as incubators for the next generation.

This insect is a native of North America, originating in the piedmont section of the South and gradually migrating north

into southern New York and westward to Kansas, attacking deciduous and coniferous trees and shrubs. In certain years it is a very troublesome pest. Its natural enemies are comparatively scarce.

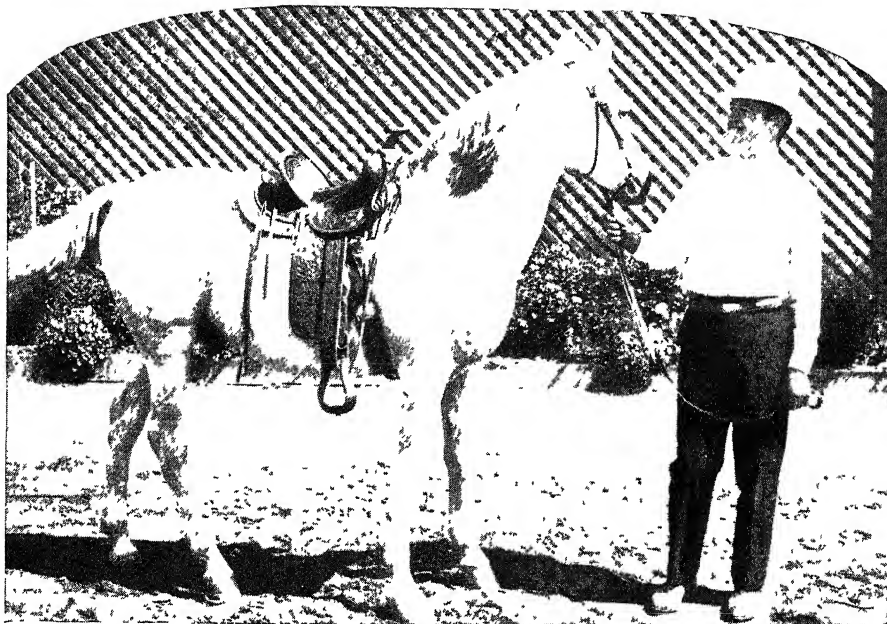
The bagworm must be destroyed! So, with this as their war-cry, the boys and girls of the grade and junior high schools of Kansas City fight a "no-quarter" duel with this insect each year.

This campaign originated in one of the General Science classes of Central Junior High School in February, 1926. Some trees on the school grounds were infested with the bags. The pupils were not acquainted with the habits of this insect so the project challenged their interest and attention. Bags were brought into the class rooms for examination. Some very interesting data were collected. With additional facts received from the United States Department of Agriculture, the members of this class aroused interest in the bagworm and organized a campaign in their school, which in

(Continued on page 190)



AN INFESTED BRANCH OF A TREE
Showing the way the bags of this pest hang on the
trees on which it preys



THE COUNTRY NEEDS MORE OF THESE
*Will Rogers, the national ego-deflater, with Letan, Arabian stallion,
 whose type is expected to bring new horse honors to the United States*

ROYALTY COMES to AMERICA

Ancient Arab Breed to Richen Nation's Horseblood

by Uthai V. Wilcox

AN INTERNATIONAL competition, but not of submarines, long range guns, airplanes or deadly gases, has been in progress. Subject to no League of Nations, this intense rivalry concerns not only the fighting land forces of the great military nations, but also the agricultural interests and to an even greater extent, those of the sportsmen.

It is a friendly contention, however, and the goals for which each nation is striving are the purest strains of Arabian horse blood. America with all her wealth is now actively seeking prize animals of the mystic East to improve her cavalry and her agricultural animals and to give her race horses and saddle horses the stamina, grace and intelligence needed to make them winners.

From the days of King Solomon—and no one knows how long before that—the Arabian has commanded the admiration and the respect of every one who loved horses or used them. The blood of these desert creatures has come to stand for the best. Because this is true France maintains national stables for the purpose of preserving the blood and mixing it with her own stock, and Italy, England and Germany have their own royal stables where Arabian horses are kept with the purpose of giving the cavalry the best that can stand up under fire. America, due to the efforts of W. K. Kellogg, the

food manufacturer, has now entered the lists that bid for this prize heritage.

Near Pomona, California, on a great ranch thousands of acres in extent and equipped with white, spotless, fire-proof stables grouped around their quadrangle of emerald turf, Arabian horses rule. There are uniformed grooms to serve them. There are acres and acres of fertile grain fields, and pastures lush and green. These forty-odd proud horses, the least of them a beautiful example of blood breeding, are kept for the avowed purpose of enriching, through breeding, America's stock.

In order that this nation may become the great leader in all affairs equine, Mr. Kellogg is propagating in a strictly scientific sense the finest horses of the Arab strains that can be bred. He already has some of the best blood in the entire Arabian world. With the help of scientists from the United States Department of Agriculture, the most modern methods of breeding are being carried on. Size, height and saddle conformation are being developed with painstaking skill. Endurance and stamina, as well as gentleness and docility are being preserved.

Mr. Kellogg seeks to do with horses what Luther Burbank accomplished in the horticultural field. He has confidence in Arabians to make a real and lasting contribution to the work, pleasure and military stock.

of the country. He intends to make his horse ranch a permanent source of high-type stallions and mares—breeding stock which will perpetuate the Arabian horse in America, and which at the same time will be used to improve the rank and file of our saddle horses. He is looking forward to a time when horseback riding, indulged in by thousands, will bring increased health to a great part of the population.

The horsemen of the world all bow before the qualities that the Arabian horse possesses. Historical research has definitely established that of all horse tribes that are descended from the Libyan, the Arab has always been the most outstanding.

He is not a wild creature of the desert country, but has come to thrive in Arabia largely because the love of horses has been bred so deeply in the soul of the Arabian tribesman. Hardy, good-natured, able to subsist upon a minimum quantity of both food and water, he has been cared for as no other animal in the world. Due to the affection, and even the religious fervor and jealousy with which the Arabs regard their mounts, the demand for him far exceeds the supply. The Arab will not sell his favorite. He will not breed his animals unless their blood lines are pure. These factors have made the Arabian horse the world prize in quality and in price.

History shows that by long and careful breeding the present superior type of Arabian horses has been maintained for more than three thousand five hundred years. There is the account of how Mohammed, anxious to secure mounts that would stand up under the rigors of his campaigns, kept a hundred mares penned up in sight of a sparkling stream, but without water, for four days. Finally released, the frantic animals dashed for the stream. Just as they were within a few yards of it, Mohammed caused his bugler to sound the call to halt. Five obeyed—but the others continued their mad dash for water. These five, at the first notes of the bugle, aligned themselves in battle formation, thus proving their blood. They became known as the "Prophet's Mares"—and bred to the best Arab stallions, began what is now known as the five leading

families of the type. Such is the military training.

The pure desert-bred Arabian has always been noted for courage, intelligence and endurance. Accustomed to subsisting on scant water and forage, subjected to the burning heat of the desert, he is capable, nevertheless, of carrying heavy loads for great distances. Powerful and swift, raised almost as a member of the family by the desert tribes, he is invariably gentle, affectionate and tractable.

To prove the endurance of these creatures, Captain Frank Tompkins of the Eleventh Cavalry of the United States Army and superintendent of military instruction at Norwich University, Northfield, Vermont, tried a little test over the hills of Vermont.

Having occasion to go to Fort Ethan Allen, at Burlington, Capt. Tompkins rode the five-year-old Arab horse, Razzia, fifty miles in the morning, attended to his business at Fort Ethan Allen, and rode back to Northfield the same day. The Arab carried 175 pounds on his back, the entire time on the road was fifteen hours and thirty minutes, and he was never distressed. The next morning he was in perfect condition to repeat the feat. A large part of the trip was over slippery roads and there was much rain.

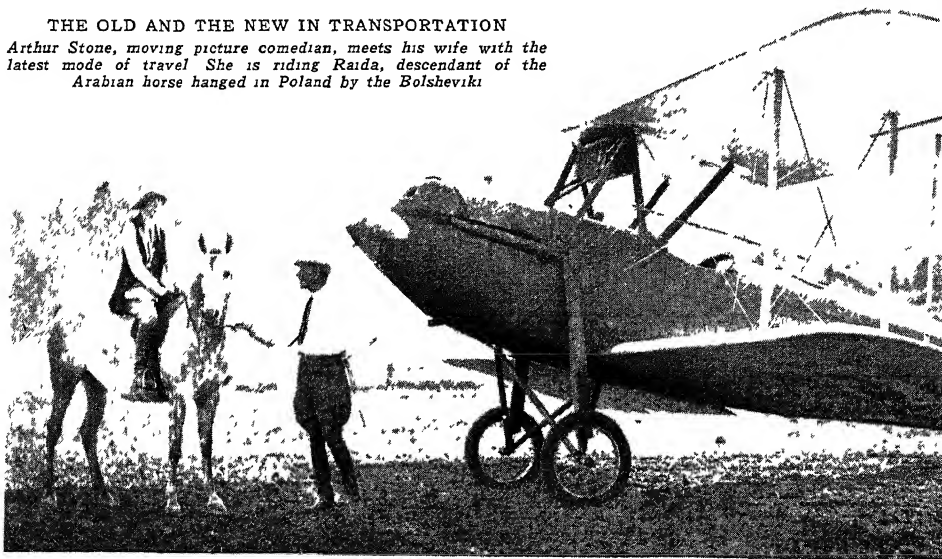
The Arabian is noted for sure-footedness, he is able to run easily and without falling over loose stones and on slippery pavements.

Speed is another quality. The best of the Kentucky horses of to-day have the Arab strain strong in their veins. For more than a hundred and twenty-seven years, every winner of the famous Derby descended from an Arabian. Nearly eighty-seven per cent of the winners descended from one great stallion.

George Washington rode an Arabian through his campaigns, and Bonaparte pinned his faith to the white Arab, Marengo, that carried him through his campaigns in Egypt and the freezing retreat from Russia. His stuffed skin is still preserved in Paris. Wellington would trust himself to nothing but an Arab horse. Kitchener and Lord Roberts rode no others.

There are many famous members of the famous tribe now located at this California horse ranch where

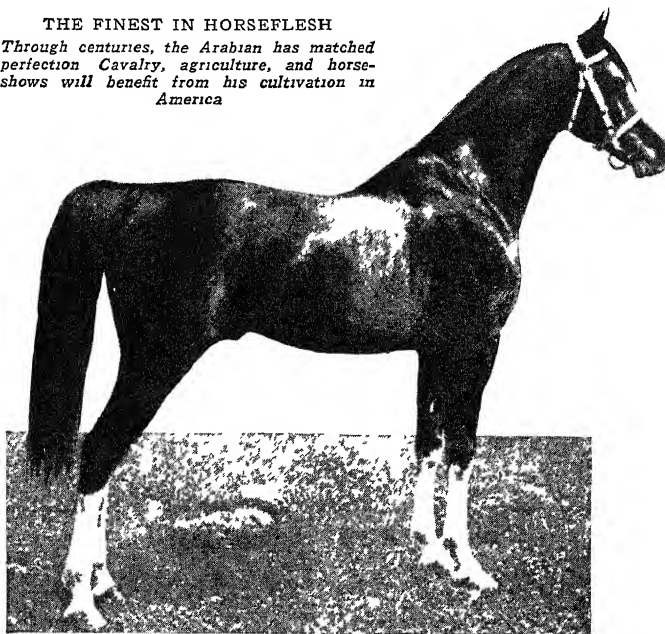
THE OLD AND THE NEW IN TRANSPORTATION
Arthur Stone, moving picture comedian, meets his wife with the latest mode of travel. She is riding Raida, descendant of the Arabian horse hanged in Poland by the Bolsheviks.



scientific horsemen are utilizing them to the best interests of America. Some of the horses have blood lines that extend back to the dawn of history, perhaps to the days of King Solomon, who bred horses for the chariot trade and whose great stables have but recently been uncovered.

There is the horse Raseyn, five years old, whose sire is Skowronek, owned by Lady Wentworth of England, who refused 50,000 guineas for him. Skowronek and his sire were owned by a great Polish family at the time of the World War. When the Bolsheviks obtained power in Poland they hanged the sire of Skowronek on a scaffold as they would hang a man, because they associated the royal line of horse heritage with that of kings. But Skowronek was smuggled out with mud thrown over him so he would not be recognized, and thus he was saved from an ignominious death. It is such care and regard for Arabian horse blood as this that has given to the world the long proud line that Mr. Kellogg wishes to spread effectively about the country.

THE FINEST IN HORSEFLESH
Through centuries, the Arabian has matched perfection. Cavalry, agriculture, and horse-shows will benefit from his cultivation in America.

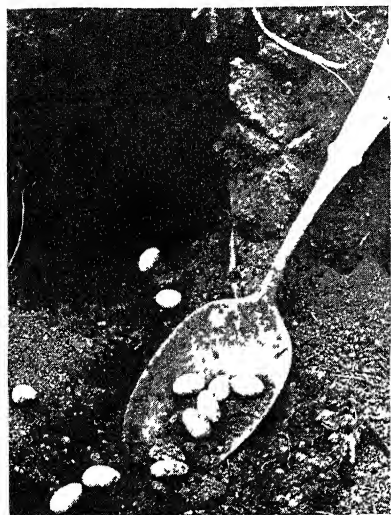


No one knows the wonderful qualities of the true Arabian better than the desert owners themselves, who live by and with their horses. The Algerian chieftain, Abd-el-Kader, said "If in the course of your life, you alight upon a horse of noble origin, with large, lively eyes, wide apart, and black broad nostrils, close together, whose neck, shoulders, haunches, and buttocks are long, while his forehead, loins, flanks, and limbs are broad, with the back, the shin-bones, the pasterns and the dock short, the whole accompanied by soft skin, fine, flexible hair, powerful respiratory organs, and good feet, with heels well off the ground, hasten to secure him if you can induce the owner to sell him, and return thanks to Allah morning and night for having sent thee a blessing."

The Kellogg Horse Ranch not only is fitted with every scientific device for its mission but it has an airplane field and is able to send its horses, if desired by airplane to any part of the nation. Thus the oldest quality of rapid transportation is coupled with the most recent

MOTHER LIZARD MAKES HER NEST

By Leslie L. Haskin



IT WAS late in June when mother lizard left the rail fence which was her accustomed home and hunting ground, and went out into the dry, sandy meadow. She had great hopes. She did not choose the softest sand in which to make her nest, but sought a bank of rather hard clay, lest the trampling of hooved feet should break through and crush the eggs. There she worked for three whole days fashioning a slanting burrow. Deep enough she made it, so that the undue heat might not dry up the eggs and cause the young to perish from lack of moisture, yet not so deep but that the sun's rays could warm and incubate them. In the bottom of her finished tunnel she placed her treasures—a dozen or more—and then carefully filled up the hole with soft dirt. There she left them, nor ever saw them again except by chance, and then did not know them as her own. Such is lizard motherhood.

THE MOTHER AND HER BROOD

A teaspoon holds her entire family, and is nearly large enough for the mother, too, who seems to be hiding from the photographer.





THE NEGATIVE
This is the result of the plaster poured into the track. Note the great detail obtained.



THE POSITIVE
Made by soaping the negative, and treating it as the original track was treated.

TRACKS

A Unique Method of Collecting Them

by Russell Aiken

THERE are only a few methods of collecting tracks. Drawing the tracks on paper after making careful measurements for size of foot, length of stride, and other details is limited to those who have at least a slight amount of artistic talent. Photography, though it has no superior when it comes to recording tracks in the snow, yet necessitates portrait lenses, filters, expensive cameras outfitted with sharp-cutting anastigmat lenses and ground-glass focusing. Weather conditions often make photography impossible.

A third way, however—collecting in plaster—is quite satisfactory. True, it is limited to tracks that are located in mud, clay, or hard sand, but after all it is these places that the best sets of tracks are found. And the method is simple.

Just get some plaster of paris at your druggist's or hardware dealer. For mixing, a fruit jar will do, but see if your dentist won't order you a little rubber mixing bowl such as he uses. As the whole procedure consists merely of making a cast of the track, a form into which the plaster is poured will be necessary, but four small panes of glass pushed into the mud to form a rectangle around the track serves quite well. Drive them well into the mud and plug up the four corners. Stir

your plaster and water together, adding plaster until the mix has the consistency of thick cream, then pour the mix into the mold slowly. It won't harden for quite some time. If possible, allow it to set overnight. If you are in a hurry, add table salt to the mix before pouring, and this will hasten the hardening.

After removing the cast, when hardened thoroughly, wash it to remove sand, mud and other accumulations. This is your negative cast. To get a positive cast, with the track imprinted into the plaster just as the original was imprinted in the mud, place your cast on a flat board, track side up. Apply several coats of shellac, lacquer, or clear varnish. When this has dried, get a heavy lather of soap and water on your hands and rub it over the surface of the negative. Again build your four walls around the cast, plugging the bottom edges and end with modeling clay or mud and pour in your mix to a thickness of about three-quarters of an inch. If you add asbestos powder the cast will have a tougher and more durable quality. Experience will teach you the proper amount to add. A small eyelet set into the top of the cast before it solidifies will enable you to hang it on the wall. The date of collection should be cut or scratched on the back when it has partially hardened.



COLORED PICTURES

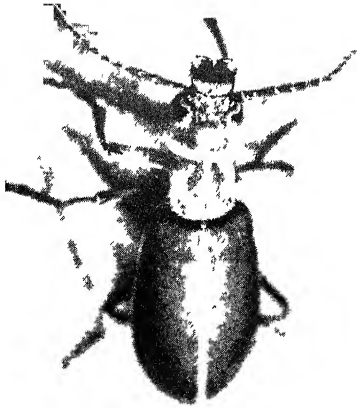
Readers of Nature Magazine will, we are sure, be delighted to hear that we will resume, in the pages of Nature Magazine, the publication of the beautiful colored paintings of wild life by R. Bruce Horsfall. This will become effective in as early an issue as mechanical considerations allow,—probably with the June issue of this year.

THE BEETLE FAMILY

by C. F. Greeves-
Carpenter

Photographs by Cornelia Clarke

Another article in the series on
Breeding Insects as a Hobby



A BLISTER BEETLE
*This fellow has the characteristic chewing
and biting mouthparts*



QUITE INTERESTING
*The western twelve-spotted cucumber beetle
is worth the study given him*

THE class Insecta is divided into a number of different orders. The average person is familiar with the order Lepidoptera of butterflies and moths, the order Orthoptera which includes cockroaches, earwigs, crickets, grasshoppers and a few other closely-allied insects, and the order Coleoptera or beetles. This last group contains about as many described members as all the other orders of insects put together and consists of approximately forty per cent of all the species in the animal kingdom. Its members can easily be recognized by the fact that they all have hard, leathery wing-covers or elytra which cover protectingly a pair of fine, membranous wings, the organs of flight, and the abdomen. They all have biting and chewing mouthparts, and undergo a complete metamorphosis,—that is, they go through four distinct stages,—the egg, larval, pupal and adult stages.

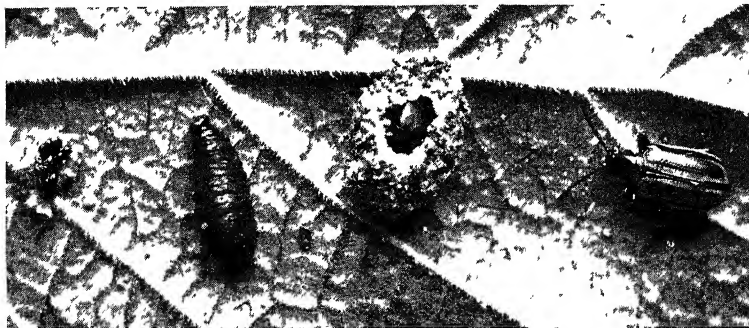
In the control of beetles it is necessary to employ an insecticide that contains a stomach poison such as arsenate of lead, so the insects, in chewing or biting vegetation, will take the poison into their stomachs. If equipped with sucking mouthparts such an insecticide would not kill them if applied to the surface of the leaves, as their proboscis would pierce any such poison and the epidermis of the leaves before the sap of the plant would be imbibed. For this other type of insect,

poison which clogs up the spiracles' or breathing apparatus and causes suffocation must be used. Thus the importance of ascertaining the method of feeding before a control method can be intelligently applied is readily seen.

The majority of the beetles are plant feeders, and some, such as the ladybirds, are very beneficial, while others do not appear to be of any economic importance.

A search in a melon patch at any time from February onwards will undoubtedly reveal a number of green beetles, slightly resembling ladybirds. These will be the *Diabrotica* or cucumber beetles. A number should be captured and put in glass vials, and then taken home for an examination and close comparison. The specimens unlike the others should be placed in separate breeding cages, and the life-histories of them all recorded carefully. A number of sprigs of alfalfa or young beet plants should be planted in each cage, for the *Diabrotica* beetles are leaf-feeders, and appear to prefer these vegetables, and are partial to cucumbers.

The adults of different sub-species vary in their markings. One may have bright green elytra with twelve black spots, and with head, antennæ, legs and body of the same color. Its average length is about one-quarter inch. This specimen is the western twelve-spotted cucumber beetle, *Diabrotica soror* Leconte. Another, the twelve-



**FROM EGG TO
ADULT**
*Introducing the
egg, larval, pupal
and adult stages*

**SEE FOR
YOURSELF**
*It is easy to make
life-history studies
of common insects*

spotted cucumber beetle, *D 12-punctata* Olivier, is slightly larger in size and the elytra are a paler green, though they display, likewise, twelve distinct black spots. In the case of the western variety, the spots are likely to be fused into one another, but this is seldom the case with *D 12-punctata*. The head is black, and the body and first three joints of the antennæ are yellow. The obscure twelve-spotted cucumber beetle, or *D 12-punctata tenella* Leconte, is similar in general appearance to the last described insect, but the wing-covers are of a dark shade of green, and the black spots may be faint and obscure or absent entirely. The head is either black or dark green, and the body, antennæ and legs are greenish yellow or brown. The western striped cucumber beetle, *D trivittata* Mannerheim, is different from the others in that it is larger in size, and, instead of being spotted, has three longitudinal black stripes on its pale yellow elytra. The body is shiny black.

With the characteristics of leading species in mind, it will be quite simple to identify the insects captured, and it remains only to place them in the



BUSILY AT WORK

The larvæ destroy a leaf of the Chinese lantern plant, while preparing for the pupal stage



A CLUSTER OF EGGS

They are deposited from March to May near the bases of plants. These are enlarged fourteen times

breeding cages, and to watch their manner of feeding and egg-laying. The females lay their eggs from March to May, depositing them about the bases of the plants to a depth of half an inch. The ova hatch into larvæ in about ten days' time. A larva will attack the roots of the plants, burrow a tunnel into the base, and, on becoming full-fed, or mature, will leave its tunnel and form a small cell in

the earth in which to pupate. A few weeks later the imago, or perfect insect, will emerge.

Virtue, in the field of ethics, is its own reward. Likewise, in the field of science, observations, though time-taking and requiring patience, bring their quantum of delight in the knowledge gained and the miracles of life seen. And to the scientific minded, the changes of a cucumber beetle are as wonderful as those which take place in the heavens. Just try this axiom out and see.

So much for study's sake. But, as we have discovered, many beetles must be controlled, and the present species, with its relative, the striped cucumber beetle, engage in another way the earnest attention of the growers of cucumbers.

THE HEXENBESSEN

I HAD been seeking these freakish growths among the foothill firs of Western Oregon, and had found them not uncommon. A farmer offered to show me where a "monstrous big one grew." He led me for nearly a mile up the mountain side and into a narrow canyon then out upon an abrupt point—and I fairly gasped with astonishment at what I saw. This was, indeed, a notable hexenbesen! Imagine a compact, closely clipped evergreen such as are commonly used to adorn conventional lawns. Have it a flattened sphere in form, eight or nine feet tall and about fifteen feet across—perfect and symmetrical in every aspect—but terminating the apex of a



by Leslie L. Haskin

gigantic fir tree, one hundred feet or more tall. The stem upholding this aerial ball was, at its juncture with the main trunk, fully a foot through, and the bole of the tree at its base was at least five feet in diameter. Had its growth been normal this tree, no doubt, would have been much taller. I inquired of old residents in the neighborhood and found that this great ball had been in existence, apparently with but little if any change, for at least a generation. Small wonder that simple minds observing such an unusual tree should conclude that it was "hexed." What more natural than to think that some witch, for her own nefarious purposes, had blasted its growth.

Spanish Moss

A By-product of the Forests

by G. H. Lentz

Special Investigator, Louisiana Division of Forestry

PHOTOGRAPHS BY COURTESY OF THE U S FOREST SERVICE

AS THOUGH clad for some fête day, the hardwood and cypress forests of Louisiana's bottomlands are often festooned and bedecked with streamers of gray whiskers. These garlands of the forest are Spanish moss, or *Tillandsia*, and, while the trees on which this plant hangs and grows give it support, the host tree is not called upon for nourishment. Spanish moss is a true air plant and not a parasite.

"This most remarkable of all epiphytes," says Dr. Schimper in an excellent description, "often completely covering the trees in tropical and sub-tropical America, consists of shoots often far more than a meter in length, thin as thread and with narrow grass-like leaves, and only in early youth fixed to the surface of the supporting plant by weak roots that soon dry up. The plants of *Tillandsia* owe their attachment to the fact that the basal parts of their axes twine round the twigs of the host. The dispersal of the plant takes place less by seed than by vegetative means, through the transport

BRINGING IN THE MOSS

(Below) A moss-bedecked live oak stand near the Gulf of Mexico





of severed shoots, by the agency of wind or of birds."

On the patriarchal cypress these festoons of moss seem to be the heaviest, and in some cases, are so dense that very little of the foliage of the tree can be seen. But this moss also occurs in great quantities on the hard-woods as well, and especially on the gums, live and water oaks, and pecans.

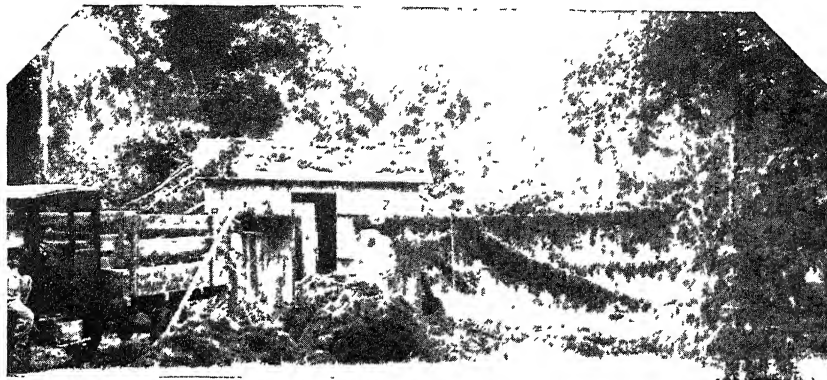
Aside from its aesthetic value the moss is of importance due to the rôle it plays as a harbinger of the cotton boll weevil, and in that it provides a merchantable product. The cotton planters would well be rid of the moss for in it many of the weevils spend the winter, and cotton fields lying adjacent to moss-draped timber are more heavily infested with the weevil. In a study carried on in southern Louisiana by the Bureau of Entomology of the U. S. Department of Agriculture, it was found that 365 weevils, on an average, wintered in a ton of moss. As yet no means of combating the weevil in its winter stage has been developed, and it is next to impossible to eradicate the moss.

The moss has a utilitarian value; it is collected on a commercial scale in many sections, particularly in the Louisiana parishes south of the Red River. There have been numerous cases where the moss rights on certain tracts of timber have been sold to moss pickers. In most cases, however, the moss is gathered on timberlands without any right having been obtained from the owner. The picking has been carried on by squatters, both white and negro, as their main occupation, while for others the income from the sale of moss has been only a side line. It has aided greatly many meager incomes.

FELLING A MATURE CYPRESS

Moss along the bayous and lakes in the Louisiana "Cajun" country





WEIGHING AND SELLING THE CURED MOSS

It must be thoroughly air dry at the time it is sold and is stored awaiting a market

The easiest method of collecting moss is for the pickers to follow behind a logging operation and pull the strands from the branches and tops that have been left. Often they become a nuisance to the woods foreman, because they are so anxious to get the moss from a certain tree that they will hardly wait for the sawyers to drop it. On one logging operation in central Louisiana the lumber company owning and cutting the timber has granted the pickers the moss rights in exchange for half of the final returns, the pickers to do all of the gathering and curing. In this particular case an old negro was granted the moss rights, and he had his entire family helping him gather the greenish gray moss from the fallen tops. An old dilapidated wagon and an ancient mule, equally dilapidated, made up his woods equipment. Three grown folks and three children gathered the moss, and with the aid of the mule and wagon, hauled in about a ton a day, the haul being about a mile, but the cost in time or labor seldom seems to enter into consideration.

In the "Cajun" country, or the parishes along the Teche River where the Acadian exiles from Nova Scotia took up their abode prior to the Revolutionary War, the "Cajun" woodsmen, fishermen, and trappers often collect moss during the closed season on hunting and trapping, or when other employment is not at hand. The country is a tangle of canals, lakes, rivers, and bayous, and these waterways take the place of roads. The region is subject to frequent overflows, and at such times, the moss is often gathered in a pirogue or bateau, and the high water enables the picker to reach well into the tree tops. A long slender pole with a metal hook attached at the end helps to pull down strands above ordinary reach.

Moss that is still alive and growing is spoken of as green moss. On the same tree with green moss may be found strands of the partly cured moss, grayish-black in color. The usable part of the moss is the hard black center thread or fibre which looks like black horse hair. This strand is surrounded by a greenish-gray layer making the whole the thickness of an ordinary piece of string. The strands branch from time to time by sending out side shoots, and the various strands may then intertwine, forming a loose mass of many strands.

After the moss has been collected, it is carried either on a man's back, by boat, or by cart to a central point,

usually the picker's shack, where it is cured. This curing process has for its object the removal of the outer layer of soft tissue so that only the black inner strand shall remain. The usual method of curing is to pile the moss in mounds six feet square and four feet high. It is piled when wet and a sort of fermentation and slow combustion takes place, causing the outer layer to rot off. After a month or so the mounds are re-piled in reverse order. Ordinarily, three months is sufficient time for complete curing. The moss is then hung on racks, fences, or any available support where it is exposed to the elements, the rain helps to wash away the loose outer tissue, and the sun dries and hardens the fibre.

Moss, after it has been gathered and cured, has lost about two-thirds of its original weight and bulk so that a ton of green moss yields only about 700 pounds of black moss. This is worth from two and a half to three cents per pound, on an average, and is usually sold to some gin operator who buys the moss from a large section of country. When they are properly cured, the strands are quite black and vary in length up to several feet. When not properly cured the fibre has a brownish-black color and has particles of the outer layer still adhering to it. The moss from cypress seems to yield the longest and blackest threads and is called "Black John", it also commands the best price from the gin operator, possibly four to five cents per pound.

At the moss gin the cured moss goes through a sorting and cleaning process, sticks and trash are picked out by hand, the fibres are pulled apart and then fed into a machine or gin that further straightens out the fibres and removes the foreign particles. Finally, the cured clean moss is compressed and packed in bales of about 135 pounds each. During the cleaning process there is a loss of fifteen to twenty per cent due to the removal of trash and short broken fibres that are eliminated by the gin. The finished product, which is used for stuffing upholstered furniture, for auto seats, mattresses, and the like, brings from six to seven cents a pound to the gin operator.

This is just another minor forest product but one which is of considerable importance in the Mississippi delta and along the Atchafalaya River. The forest trees furnish the wood to make furniture and automobile bodies, and the moss goes to make them more comfortable.

**DR LELANDO HOWARD
IN HIS OFFICE**

Beloved and honored entomologist who for half a century has studied the vast panorama of insect life



**LOVELY LUNA MOTH
AND THE KATYDID**

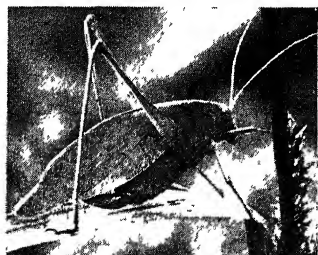
At the bottom of the page two of the many insects which lured Dr Howard to his choice of life work

FIFTY MILLION years ago, even before the earth was encumbered by such strange animals as the glyptodon and sabretoothed tiger, insects of many species lived among the lycopods and ferns and wriggled through the ooze. That was about 49,700,000 years before man appeared and the dawn of history began.

If a parade of the insects could be ordered today, between six and seven hundred thousand described species and from three to six million additional species, believed to exist in the world, would be represented in the line of march. The life habits of any one of these is likely to have an important bearing upon modern economic life, or to jeopardize public health, but almost nothing is known about them.

In a modest office in Washington there is a man who for more than half a century has surveyed and studied this vast panorama of insect life. The arch enemy of destructive insect hordes, he has wrested

from them some of their secrets; for his work he is known and honored by many nations. To talk with him for an hour is to glimpse a new world, to visualize graphically the future struggle which,



INSECT HUNTER

**Dr. Leland O. Howard, Dean of
Entomologists of the United States**

by Alma Chesnut

he predicts, must take place between man and the encroaching Lilliputian hosts.

Dr Leland O Howard, for thirty-three years chief of the Bureau of Entomology, United States Department of Agriculture, began to study insects at the mature age of six during a visit to an aunt on Long Island. He found a group of older boys collecting cocoons and heard from them the wonderful

story of how the ugly caterpillar, swathed now in sombre shroud, would emerge in the spring as a beautiful winged creature. The little boy thrilled to the mystery of it and, when he returned to his home in Ithaca, took with him cocoons of the moth *Promethea*.

At ten came a hint of the personality of the scientist-to-be. He had founded a natural history society with a membership of about fifteen boys, some four or five years older than he. Leland Howard, then as now, possessed the happy faculty of contagious enthusiasm. The boys collected moths, butterflies and other insects, small animals, birds' eggs, shells and similar objects. They studied them, too. Young Leland's father, a lawyer, bought for him books such as *The Butterfly Hunters* and Packard's *Guide to*



the *Study of Insects* Professors at Cornell University were consulted by the boy naturalists for additional information and guidance

"We used to go up to the meetings of the Cornell Natural History Society," Dr Howard recalls with twinkling eyes, "and think, boy-like, how infinitely much better our gatherings were than theirs"

Leland stored his specimens in the drawers of old bureaus and later in glass-covered boxes of his own construction By the time he was ready to enter college—and that was before he was sixteen—his collection included all of the butterflies that existed in his part of the country and practically all of the moths and grasshoppers It was not a mean collection, in later years it was presented to Cornell and to posterity

Among his most vivid recollections of early experiences insect hunting is that of the capture of his first Luna moth All of the youngsters had been seeking it, for it is, perhaps, the most beautiful of moths found in the eastern states Pale green in color, with trimmings of mauve, this fragile creature of the night seems aptly named for the moon It is a large moth, about four inches across, with delicately trailing wings

The boys had been in swimming when one of them shouted, "Luna! Luna!", and went chasing into the woods Pandemonium reigned By the time Leland had scrambled out of the water the hunt was well under way, but he found his small brother sitting unperturbed upon the bank Beside the little fellow was his hat; under the hat was the Luna moth.

Dr Howard matriculated at Cornell in 1873, intending to study medicine as his grandfather had before him With this end in view, he took the full pre-medical course, receiving his B S degree, the first of many similar honors, in 1877 The following autumn he was to enter the New York College of Physicians and Surgeons But during these years events were shaping that were destined to alter his whole career The science of agricultural entomology was being born

Three states, Missouri, New York and Illinois, were employing entomologists to study the ravages of insects upon crops and the Department of Agriculture, alarmed by the great losses reported from various sections, was mobilizing for a similar campaign more comprehensive in scope

Dr C V Riley, Missourian entomologist, had been brought to the Capital to initiate the work and was soon in need of an assistant Having heard of the Cornell student and his enthusiasm for insect studies, he offered him the post The boy accepted and, under Dr Riley, helped found the Bureau of Entomology, an institution that saves the United States millions of dollars each year

Dr Howard's medical training fitted him for leadership in another field, equally important as agriculture Intensely interested always in the part insects play in spreading disease, he became the apostle of medical entomology, accomplishing more perhaps than any other single person to promote cooperation between public health officials and

trained entomologists in studies of the hundreds of insects known to carry specific diseases or to assist in spreading others In 1904 he was made Consulting Entomologist of the United States Public Health Service. Fifteen years later he was appointed senior entomologist, with the grade of Senior Surgeon, of the Public Health Reserve

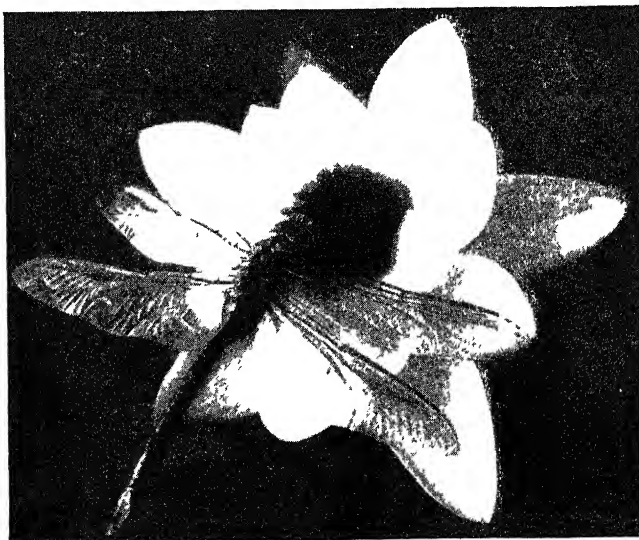
Medical entomology, in spite of its progress during the last few decades, is an unexploited field, in the opinion of Dr Howard There are hundreds of insect species, closely allied to species known to carry disease, that should be studied These, he says, include about 550 types of mosquitos in the Americas alone

The entomologists and doctors exposed the house fly as the mechanical carrier of several diseases and have done much to safeguard the world against this criminal of the insect world Dr Howard was a leader in the campaign against it, publishing many bulletins and magazine articles, beginning in 1896 and culminating in his book, *The House Fly—Disease Carrier*, which appeared in 1911 and has since been translated into many languages Extensive studies have been made of

mosquitos, too, but, says Dr Howard, we do not know all about them and further work is necessary Typhus, malaria, yellow fever, sleeping sickness and Rocky Mountain fever are just a few of the maladies insects visit upon mankind The tabulation of culprits covers some twenty-three fair-sized pages of book print

Similarly, the field of agricultural entomology is immense The human race has multiplied and spread so that today

THIS is another article in the group, specially written for *Nature Magazine*, which tells of the achievements of the members of the Scientific Consulting Board of *Nature Magazine* These are men whose names are written indelibly on the tables of accomplishment in the field to which they are giving their lives



LYNWOOD M. CHASE

THERE ARE MANY PICTURES OF RARE BEAUTY IN INSECTDOM
With no others of her offspring has Nature contrived so beautifully or so intricately

food must be provided in enormous quantities. In doing this man has created conditions peculiarly favorable to certain insects and these are multiplying more rapidly than ever, causing annual losses to agriculture amounting to about \$2,000,000,000 in the United States alone.

Hundreds of offenders are catalogued at the Bureau of Entomology, and among these Dr. Howard selects as the most dangerous the cotton boll weevil, pink boll worm, Japanese beetle, gipsy moth, codling moth, plum curculio, corn borer, Hessian fly and chinch bug. Many of these were imported from other countries on foreign plants and are particularly destructive because the insects that preyed upon them are lacking in the new environment. One of Dr. Howard's tasks has been to direct a hunt for these insect enemies, or parasites, on foreign continents, so that they can be imported and set to work.

"Studies of insects have developed some effective control weapons," Dr. Howard states, "but in the long run we know very little about them. We do not understand many of the basic problems bound up in their lives, we do not even know exactly how they smell or see. And until everything about them is known, we cannot conduct an intelligent fight."

"The universities must teach more entomology in order to supply a much-needed army of trained investigators. Chemists, physicists and agronomists must cooperate in research. As matters stand, insects would soon do away with us entirely if they did not fight among themselves."

"With the exception of reasoning power, they are infinitely better equipped than we are for the biological struggle for survival. They have been on the planet millions of years longer and some species have changed very little during all those ages, presumably because they reached their high peak of efficiency long ago. Cockroaches, discovered in rocks of the Tertiary Period, are very similar to those of today."

"The insect has its skeleton on the outside and it protects its entire body. Neither alkalis nor dilute acid affect it, nor does it grow brittle with age. From the engineering viewpoint, this outer skeleton gives the insect limb three times the strength of the vertebrate. The horn-like covering, called chitin, not only protects the muscles but makes them function better. It is made of waste materials, available in a thousand substances, while man must pick and choose to include in his diet the proteins and inorganic materials of which human bones are made."

Furthermore, says Dr. Howard, the persistence of the insect race is aided by elimination of the periods of

helpless infancy and old age. Insects never get old, they die in full vigor when their work is done. Nor is it likely they will ever suffer from a food shortage. Their miraculous ability to adapt themselves to all sorts of circumstances and environment is illustrated by the fact that there is hardly a known substance safe from attack. Old wood, garments, books, face powders, rugs, plants of all species and even petroleum, used as an insect poison, have as their destroyers certain insects.

The Bureau of Entomology tested its ability for practical work as early as the year 1879, by solving the problem of the clover midge which was attacking meadow crops in New York. It has devised ways to control the Argentine ant, one of the most destructive insects in the United States, and has concocted poison baits and sprays effective in limiting the ravages of hordes of other species.

Dr. Howard was one of the first persons to sense the menace of the cotton boll weevil, which has injured the cotton industry of the South. The country was adequately warned by him, when the weevil migrated from the mountains of Mexico to Brownsville, Texas. The plan to eradicate it was simple. Cotton growing was to be suppressed for one or two years in the small areas then infested, thereby depriving the larvae of a food supply. The Texas legislature refused to pass a bill incorporating the suggestion and the world knows the result.

Many honors have come to Dr. Howard during his years of work. In 1923 he was named Chevalier of the Legion of Honor "for service to world agriculture", and, recently, he was given the rank of Officer.

He is the only American member of the Academy of Agriculture of France and holds honorary memberships in many other foreign scientific societies. He has attended fourteen international Scientific Congresses, and presided at three of them.

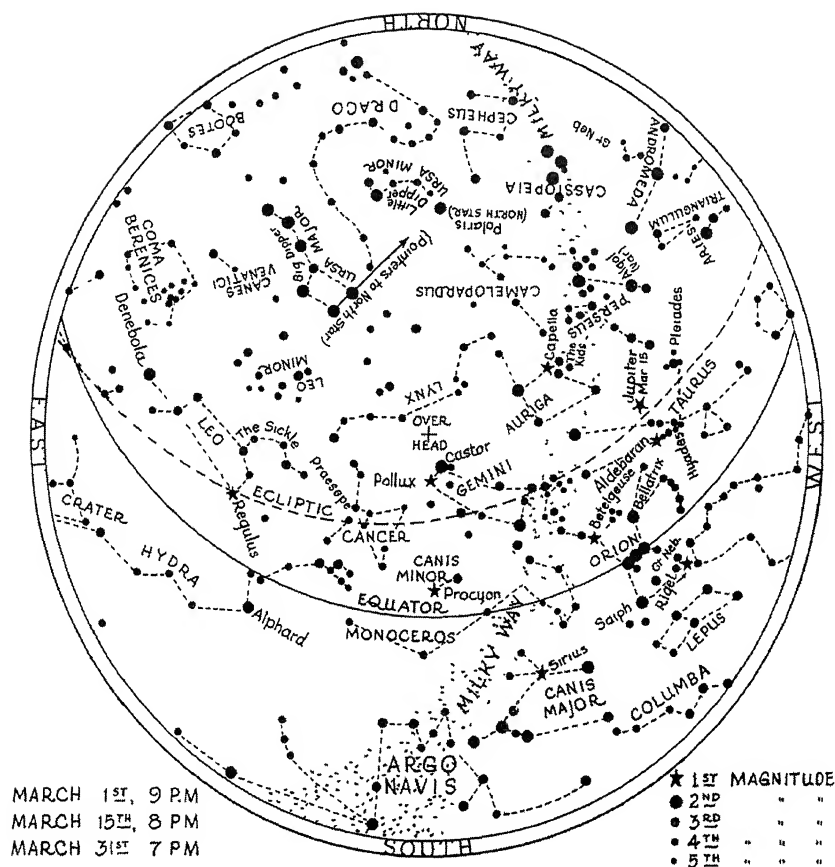
With other scientists he was called to the colors during the World War, serving as a member of the committee on agriculture of the Council of National Defense and as chairman of the sub-committee on Medical Entomology of the National Research Council. He holds the post of honorary curator of insects, of the National Museum and offices in numerous scientific societies.

Dr. Howard served the Bureau of Entomology as chief from 1894 to 1927, when he retired from this position at the age of seventy. He was continued in order that he might pursue his writings on entomological subjects. In 1931, he will be obliged to retire, and on a pension of but \$1,000 a year. The thought of relinquishing his work at the bureau does not please him.

MISS CHESNUT, who, in younger days, of course, has been bounced on the knees of several of the distinguished scientists and friends of her father's about whom she now writes, responded to our request for a little autobiography with the following, which we present unadorned.

"I was born in Washington, D. C., the second child of scientific parents, and was raised on vitamins and calories. Upon graduation from Central High School my ambitions to engage immediately in war work, in the rôle of 'messenger gul' were forestalled by the aforementioned and horrified parents and I was sent to Goucher College, Baltimore, where I was graduated in 1922."

"While still in school I made excursions into journalism via the Baltimore American and these excursions netted me my first position. As a reporter, I did the usual amount of fire-engine chasing, interviewing, rewriting, copy-reading et al. After four or more years of this, in a moment of mental weakness, I accepted a publicity position which I soon rejected to try free-lancing for magazines and newspaper syndicates, which work now engages my attention."



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Have You Seen An OCCULTATION?

How the Moon Hides Stars and Planets from Our View

by Isabel M. Lewis

TRAVELLING in a west to east direction, the moon passes each hour over an angular distance about equal to its own diameter and conceals from us the stars that lie in its path. During the twelve annual circuits of the heavens that the moon makes, this event takes place about two thousand times. Yet how many of us can recall such an occultation, as it is called?

For various reasons most of us have missed seeing these instances. Most of these occultations are of faint stars, the great majority being just beyond or near the limit of naked eye visibility. Such events, also, are visible only within a limited area and cannot be seen—unless the star or planet is exceptionally bright—when the moon is full, in daylight or twilight or when the moon is near the horizon. Then, too, many fine occultations have a way of happening about two or three in the morning

when one's interest in astronomy might reasonably be expected to be at a low ebb.

Since the moon's path lies in that belt of the heavens known as the zodiac, it is only the stars in the zodiacal constellations that can be occulted by the moon. Among the first magnitude stars only Aldebaran, Pollux, Regulus, Spica and Antares can be occulted because they are the only stars of first magnitude in the zodiac. These stars and the planets Venus, Jupiter, Mars and Saturn furnish the most interesting occultations. An occultation of Venus or Jupiter by the moon is such a rare and impressive event that one would never regret getting up, if necessary, in the small hours of the morning to observe it.

An occultation will last, in extreme cases, about an hour and a half and it may last less than a minute. This

occurs when there is not much more than an apparent grazing contact of star and moon. When the moon passes through the Pleiades cluster several occultations will occur close together and it frequently happens that several occultations take place on the same day.

As the interested observer watches for the occultation to take place he notes that the moon is moving eastward with respect to the stars. Thus the disappearance of the star behind the moon or its immersion, as it is called, will take place at the *eastern* limb of the moon and its reappearance or emersion at the *western* limb. The disappearance of the star will take place with startling suddenness, one proof that the moon has no atmosphere, for an atmosphere would cause a gradual dimming of the star's light just before its disappearance. The reappearance of the star occurs with the same suddenness as its disappearance. In the case of a planet the two events do not occur quite so suddenly since the planet has a perceptible disk and it takes an appreciable interval of time for the moon to cover this disk completely.

Although, as we have said, something like two thousand occultations are listed each year, less than three hundred *different* stars are occulted. On successive months the moon returns very close to its previous paths and there is a considerable overlap of the regions covered on each circuit of the heavens. Thus the same star may be, and frequently is, occulted several times during the year, the same is true of the planets. For example, the planet Saturn may be occulted as many as ten times in a single year. Yet of all these ten occultations not a single one may be visible under favorable circumstances in any one locality.

Occultations are of very great value to the astronomer who is trying to solve the problem of the well-known irregularities in the motion of the moon that have proved to be so puzzling. In order to improve the tables upon which the prediction of the moon's positions in the heavens from day to day and hour to hour is based, and to test their accuracy, it is necessary to have a number of observations of the moon's true position in the heavens, and this is exactly what observations of occultations and also of eclipses give us. The positions of the stars are known to a very high degree of accuracy, and when the moon is occulting a star its position is then determined from that of the star with equal accuracy. A comparison of the predicted and true position of the moon at the time of the occultation shows how much the predicted place is in error. Observations of a large number of occultations are used to correct and improve its predicted places in its orbit.

One of the foremost astronomers of today working upon this problem of the moon's motion, Professor E. W. Brown of Yale University, whose *Tables of the Moon* are now so widely used in predicting the moon's position,

has broadcast an appeal to amateur and professional astronomers to observe more occultations of stars and planets. As a result there is now a great revival of interest in all parts of the world in the observation of occultations. Such observations are very easily made since all one needs is an accurate timepiece and a knowledge of the approximate time when the occultation will begin and end. The observation of the accurate time of the disappearance or reappearance or both, if possible, is all that is needed.

In addition to the *Elements of Occultations* published in the *American Ephemeris*, the occultations that will be visible at Washington during the year are also published. In the present year there are over one hundred occultations visible at Washington, but about ninety of these are too faint to be visible without the aid of a telescope or opera glass. Of the remainder there are but two of special interest, one an occultation of a third magnitude star, Sigma Scorpii, in June, and the other a daytime occultation of Antares in October. In March there are nine occultations of stars but all of these stars are extremely faint, at, or beyond, the limit of visibility for unaided vision.

Among the planets this month Jupiter is still of special interest. It will be found in Taurus about five degrees nearly due north of Aldebaran. At the beginning of the month it will be a little to the west of the meridian at sunset. Mercury and Mars are in conjunction on March 1 in Capricornus and are too low in the southeast just before sunrise to be seen. Venus is now in the western evening sky, but is still too near the sun to be visible until late in the month. Then it may be seen near the western horizon immediately after sunset. Saturn is now in Sagittarius and rises in the southeast after midnight, and by the end of the month will be nearly due south at sunrise.

On March 21 at 3 30 a. m., eastern time, the sun will cross the equator coming north and spring will commence in the northern hemisphere.

The constellations of spring are now succeeding those of winter in the eastern half of the sky. The Sickle, in Leo, is high in the east. The head of Hydra, The Water-snake, lies directly south of Cancer and a few degrees due east of Procyon, The Little Dog-Star, which is on the meridian due south at 9 30 p. m. on March 1. The twins, Castor and Pollux, in Gemini, are also on the meridian at this time, nearly due north of Procyon. Sirius, The Dog-Star lies to the southwest of Procyon, and Orion is now far over in the southwest. Capella, Aldebaran, and Jupiter are conspicuous in the west and the brilliancy of the constellations now in the western sky, the groups of winter, which will soon be gone, is in marked contrast to the milder radiance of the stars of spring rising in the east. Get out your telescopes

In May Nature Magazine will present the fourth geographic number which is the Upper Lake States number. Michigan, Wisconsin and Minnesota are the three states covered by this issue, which will be a worthy companion to the California, New England and Florida issues of earlier date. Four copies may be ordered in advance and sent to any four addresses for one dollar.

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THINGS to THINK ABOUT

West Coast Billboards

A remarkably successful contest was that of the Standard Oil Company of California, which sought to crystallize in word and picture material that would aid in the campaign for restoration of our highways to beauty through the elimination of marring outdoor advertising. There were four separate divisions to the contest. One sought the best essays on how the objectionable signs could be eliminated, the second sought essays on why they should be eliminated, the third asked for the best slogans for arousing public sentiment, and the fourth offered prizes for the best photographs showing actual defacement of the roadsides.

The first prize of \$1,000 for the best essay on the prevention and elimination of objectionable signs went to Alwyn J. Baker of Berkeley, California, who presented a carefully thought out program of organization. Second prize went to Col. C. G. Thomson, Superintendent of Yosemite National Park, and the third to Wallace I. Hutchinson, U. S. Forest Service in San Francisco. Frederick Black of the Yosemite Park and Curry Company won the first prize for the best essay on why objectionable signs should be eliminated.

In the slogan division of the contest Ralph J. Rivers of Seattle carried away first prize with the slogan, "Why 'Sign' Away Beauty?" Arthur T. Ward of South Pasadena, California, took second place with "A Sign Removed is a Scene Improved." The third place was a tie between Henry J. C. Humphrey of San Diego and Esmer Saxton of Newport, Oregon, who had, respectively, the slogans, "Landmarks—Not Trade-marks," and "Roadside Beauty—A Roadside Duty."

Prizes in the photographic division, which developed some startling pictorial testimony, went to Henry W. Cole, Port Angeles, Washington, Elmer Cunningham, Sacramento, California, B. G. Walker, Oakland, California, Dr. C. W. Benson, Los Angeles, Mrs. Dorothy Allen, Reno, Nevada, and Dr. Benson again with a fifth prize.

This contest has aroused widespread interest and discussion of the Pacific Coast. It reflects the wisdom of the Standard Oil Company of California in recognizing the public right to beautiful rural highways for which they pay. This company has removed its signs and now makes this added contribution to public education and interest in this stimulating contest.

The Woodcock's Journey

We note that the hunters are not satisfied that the woodcock is still on the game list, but are chafing under the restrictions imposed by the one-month open season and the four-a-day bag limit. The usual arguments, "still plentiful," "increasing," "no

A Page Devoted to Conservation from Varying Angles

trouble to get the limit," "laws passed by swivel-chair Nature students," are being broadcast.

Such malcontents seem to forget that the woodcock is a migratory bird, and that the migratory bird law is for his benefit, not the hunter's. The flight that starts South with the October full moon must run the gauntlet of shot in many states. A woodcock raised in Quebec begins to hear the guns on the first of September. If he survives he may dodge shot in New York (and it will keep him busy) during October. In Ohio or Pennsylvania the guns will keep popping until mid-November. Farther south, say in Virginia, if his luck is still with him, he can hear them until mid-December. If he is still on the wing and keeps moving to the next tier of states, New Year's day marks his first legal respite from the leaden pellets. Then he may start North to try to raise a family to repeat this interesting, though hazardous experience. His little family will be about two.

During this four-months' fusillade our woodcock friend has never been in any state where he was in danger from shot for more than one month. But during his noisy trip from Quebec to Georgia what chance has he had to reflect on the good fortune that decrees that his open season shall last only thirty days? So this is civilization.

Sportsman and Farmer

Among the problems that are being seriously considered by those who have become alarmed by the realization that our game supply is dwindling is the "farmer". Most of the game now left is on his land. And the farmer is becoming more and more reluctant to allow sportsmen, by and large, to hunt over his property. Both the sportsman and the ammunition manufacturer have been studying this problem—from their own standpoints—and have concocted various plans to offset this condition. The farmer also has been studying the problem in his own way, mainly by observing the habits of the gunner, but he has seldom put the results of his study into print. We are gratified, therefore, to see that one farmer's wife has recorded some of the reasons that are behind this reluctance to open the farm land to shooting.

In "A Farm Woman Speaks", Mrs. Grace McCormac French of Carlton, Oregon, has recorded, under the auspices of the Oregon Federation of Women's Clubs and the Oregon Audubon Society, some experiences with hunters, who, having paid the state for a license, seem to assume that this

carried the privilege of doing as they pleased on lands about the farmhouse. What they pleased included, in various instances, threatening and cursing the mothers and children, shooting so that shot or bullets hit the house, shooting the chickens, and setting dangerous fires. "Such things are not done by sportsmen," say the Game Commissions and the sportsmen's magazines. Quite true, but a man is known by the company he keeps and the real sportsman is often in bad company. We are glad that the farm woman is beginning to have her say. She and her husband have the right to enjoy in their own way, whether as game or as free wild life, the birds and animals that the farm supports. And we are glad that the women's clubs and the Audubon societies are helping to spread this point of view.

Save "Billy-Blue-Gum"

One of the most fascinating, lovable and interesting of the world's mammals is facing extinction. In his comparatively brief career with firearms as weapons, man has made remarkable strides in extinguishing beautiful and beneficial forms of wild life. Perhaps none of these, however, is as sad as the fate of the Koala, or Billy-Blue-Gum, as the native bear of Australia is known.

Indigenous to the three eastern states of Australia, this trusting little fellow is the one representative of his genus. It is a symbol of innocence, with its child-like expression of constant wonderment. Yet continual persecution has doomed the little mammal so that the only place where it is not rapidly disappearing is on two islands in Westernport Bay, Victoria, Queensland, formerly boasted many of the bears, but in July, 1927, a terrible slaughter took place when the season was opened, and the official figures show that 584,738 of the bears were killed in one month, not to mention a probable loss of 200,000 babies that perished with their mothers.

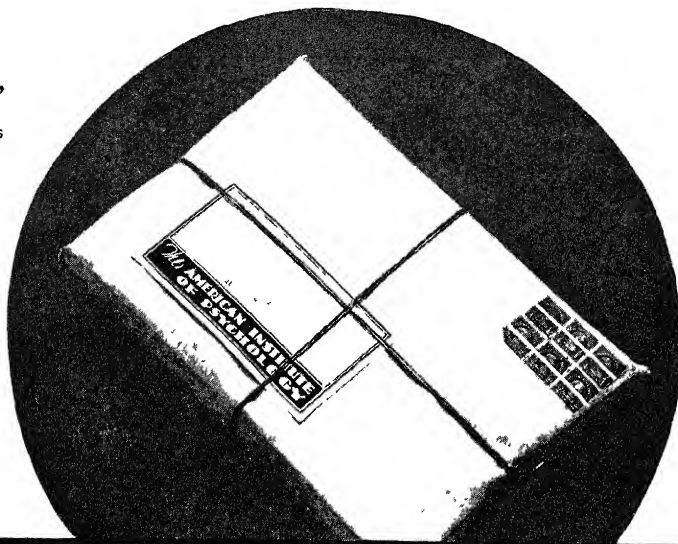
The solution seems to lie in sanctuary, absolute protection and what amounts to propagation under ideal conditions. Investigation reveals that certain varieties of eucalyptus serve as food for the Koala, particularly the "Blue Gum" eucalyptus—whence the name Billy-Blue-Gum. The cutting off of these trees has further complicated the problem, so, also, has settlement. Under the leadership of Noel Burnet, "Koala", Moira Avenue, West Ryde, Sydney, Australia, a campaign is being made for the raising of funds to acquire a real sanctuary, properly stocked with fodder trees, for Billy-Blue-Gum. Help will be appreciated from any source. Perhaps some of our readers have met this charming little bear and will want to help preserve him for posterity by some gift.

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Judge Simmons' own true life history is like a fairy story. Born in obscurity, he became and now is judge of the highest trial court of his state. For years struggling against bitter financial discouragement, he now possesses his own city and country homes and all that makes a happy, care-free life. Almost unknown in the early years of his professional life, he is now loved and respected by literally thousands of men and women in this and foreign countries whom his teachings have helped to success and happiness. And was selected by Psychology Magazine as one of the great masters of Psychology to lecture at its educational conference at Lookout Mountain. Ridiculed and vilified only a score of years ago for his radically different and astounding lectures, magazine articles and books on practical psychology, he is today blessed by doctors, lawyers, ministers, merchants, artists, teachers, farmers, housewives and others in practically every walk of life who have obtained through his teachings the greatest desires of their hearts.

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(Continued from page 149)

A million votes probably represent as large a proportion of Nature lovers as do the totals in a presidential election in representing the grand total of eligible voters. And even if this statement is not sufficiently conservative, the efficacy of "straw" votes in showing the true opinion of the people has been proved in several national elections by the *Literary Digest*. It is signifi-

The wild rose, despite criticism to this effect, is not the flower of England, her emblem is the cultivated rose. The campaign did not designate one particular variety of wild rose, but left it possible for each community to feel that its local representative of the genus was the people's choice.

It has been a good contest. The supporters of the columbine may feel confident that their flower stands second, at least, in the public esteem. And the wild rose, if Congress follows the commands of the electorate, will fill a void, that has never been filled

	WILD ROSE	COLUM- BINE	VIOLET	GOLDEN- ROD	PHLOX	AM BEAUTY ROSE	DAISY	MT LAUREL	DOG- WOOD	SCAT- TERING	TOTALS
ALA .	10,814	827	1,918	3,496	3,517	535	591	182	822	758	23,460
ARIZ	1,020	524	124	154	71	28	5	15	21	113	2,075
ARK	1,933	86	265	376	90	97	339	12	148	1,240	4,586
CALIF.	14,597	8,091	3,293	2,892	3	452	19	18	201	955	30,521
COLO	4,767	5,474	275	637	81	706	14	1	17	501	12,473
CONN	5,886	3,756	535	1,797	160	391	151	993	120	787	14,576
DEL	739	203	198	15		20				143	1,318
D C	3,514	955	589	259	532	84	64	249	1,527	478	8,251
FLA	4,176	27,422	653	734	99	24	16	24	36	45	33,229
GA	5,704	234	1,106	4,086	2,089	174	1,966	2,426	123	257	18,165
IDAHO	2,526	525	357	439	149	214	36	20	36	361	4,663
ILL	20,160	23,114	4,205	3,927	753	2,060	435	143	300	1,779	56,876
IND	10,040	5,765	2,037	1,664	692	767	316	9	36	1,009	22,335
IOWA	26,250	6,858	3,340	3,011	1,406	556	325	102	48	846	42,742
KANS	6,602	794	578	1,204	320	348	57	4	7	269	10,183
KY	3,736	737	832	2,318	1,004	417	325	324	165	644	10,502
LA	3,197	110	231	266	304	24	122	319	11	75	4,659
MAINE	6,393	964	735	1,485	159	101	35	96	4	107	10,079
MD	1,758	871	453	285	104	112	12	30	59	1,205	4,889
MASS	4,890	4,962	787	632	241	200	265	278	2	546	12,803
MICH	22,392	7,026	4,445	3,166	1,427	978	445	104	491	900	41,374
MINN	11,949	18,891	7,896	994	928	666	115	7	22	518	41,986
MISS	4,611	179	1,305	2,421	123	496	552	31	286	378	10,382
MO .	15,376	3,771	3,131	2,348	619	1,130	601	33	44	1,433	28,486
MONT	5,466	1,217	418	677	163	438	43	13	4	244	8,683
NEB	3,301	635	348	1,530	166	486	233	15	26	536	7,276
NEV	524	124	33	131	19	64	97	2	23	24	1,041
N H	1,006	528	236	374	35	36	6	17		65	2,303
N J	11,783	9,473	3,507	1,734	1,405	1,849	719	1,427	188	1,445	33,530
N MEX	673	142	121	146	30	218	15			85	1,430
N Y	26,224	21,003	4,972	2,561	1,254	2,705	1,470	1,202	277	2,167	63,835
N C	5,430	2,296	1,765	2,128	493	167	323	152	75	720	13,549
N D	23,637	7,172	1,197	3,356	393	43	72	36	31	637	36,574
OHIO	33,361	15,742	9,054	9,195	3,489	3,084	706	598	1,077	2,342	78,648
OKLA.		695	1,401	842	680	297	287	12	75	304	7,549
				1,243	376	952	77	24	125	169	12,372
				1,537	2,269	1,668	593	2,045	854	1,700	111,256
					50	158	9	136	7	33	1,920



PLANTING THE GARDEN, MONTH BY MONTH

By ROMAINE B WARE

JUST as soon as the frost is out of the ground, actual outdoor planting may be started. The first material that should re-

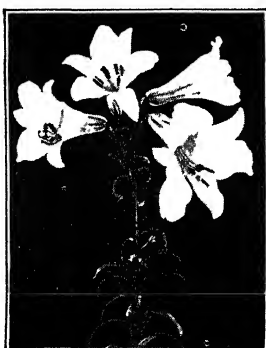
ceive attention is shrubs. This work naturally divides itself into two parts, the planting of the new shrubs which should if possible be dormant and the transplanting of old shrubs that we for some reason or other want in different places. The latter group needs attention first.

Many a garden or yard contains shrubs of various sizes that are planted in the wrong place. The owner realizes the fact but for some unknown reason fails to move them. It is comparatively simple to do this but there seems to be a fear that they will not live if moved. Practically any shrub may be moved if the right method is pursued. Rhododendrons and a few other things are somewhat difficult but even these can be moved if care is used. Rhododendrons should not be moved at this time however. All deciduous shrubs, those that lose

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Lilium auratum



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All the above are now ready for immediate delivery, plant in early spring as soon as ground is workable.

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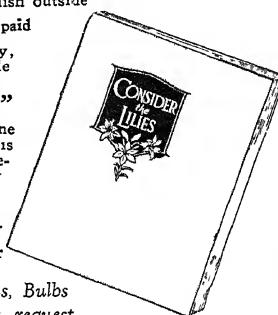
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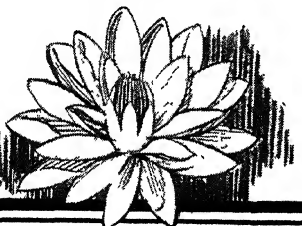
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Waterlilies

Saddle River
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their leaves in the fall and leaf out again in the spring, may be moved now. If possible it should be done before the leaves burst forth. The setback is much less then. When you move an established shrub, you destroy more or less of the feeding rootlets and this is the main cause of damage to the plant. If it were possible to dig a shrub with a sufficiently large ball of soil so that all the roots were contained within it, the plant would hardly know it had been moved. Generally this is impossible except with shrubs that are small or have only been in place a year or two. Older, established shrubs have extended their roots far and deep and when you dig them up, many, especially the fine feeding rootlets, are destroyed. This means that the plant will be undernourished till new growth re-establishes the balance between root and top.

Right here is one of the important points in the moving of an established shrub. If the feeding rootlets are destroyed a sufficient amount of the top growth should be pruned away to maintain a balance with the ability of the roots to supply food and moisture. This is very simple to do but so many times it is neglected and the plant has to struggle for several months with nature allowing part of the top to die in its attempt to even things up. Whereas if intelligent pruning is done at moving time the plant is in shape to go right at the work of growing new rootlets and top growth. Just how much of the top to cut off will depend upon how much of the root system is destroyed. As a general rule, about one-third should be removed. Cut out all weak or diseased branches and shorten back the rest of the top. Don't be afraid to cut as you are assisting nature rather than thwarting her desires. Use a sharp pair of pruning shears and make all cuts good and clean, always just above a bud that growth may be active and heal the wound. Cutting too far above a bud, thus leaving a stub to die, may result in rot and disease getting started.

The planting of new shrubs may be done at any time from as soon as the frost is out of the ground and as long as dormant stock is available. Dormant stock is that which has been dug and heeled in, generally in a storage cellar with just the right temperature and moisture conditions to prevent growth and still keep them from drying out. There is a great difference in the quality of dormant stock for this reason and it does not pay to plant inferior stock. Sometimes one sees shrubs offered for sale that have white shoots on them two or three inches long. These are poor stuff as much of their strength has been lost in formation of these premature growths. Shrubs of this kind will have to be pruned back severely if they are to take hold right.

Even dormant shrubs that have been handled with the best of care must be pruned back at planting time. No matter how carefully they have been grown and dug, some of the rootlets will be lost and even with the best of storage conditions they will dry out to some extent. At least one-quarter of the top and sometimes one-third, will have to be cut away. Then they will be able to start vigorous growth at once. If the top is not cut back it will dry out more or less before the roots start supplying moisture and future growth will be retarded. If you are afraid to cut them back, try it upon one shrub in a group and



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This collection includes at least 35 fine varieties, in many shades of Red, Yellow, Pink, Blue, Orange, Single, Double, all good ones but not labeled as to name. 50 for \$1.75. All sent prepaid with complete instructions for growing prize-winners. I believe this to be the finest "glad" collection offered anywhere.

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you will soon be convinced by the way they take hold

In planting shrubs, the soil preparation is important. If you do not make the soil fine so that it can contact all the little fine rootlets they will be left to perish in the air pockets between the particles of soil. Fine soil must be worked in around the roots, especially if there are masses of fine feeding rootlets. If in contact with soil as nature intended, they are immediately ready to start supplying food and moisture to the stems and branches. Then leaf growth may start as it should.

The planting of evergreens is even easier than deciduous shrubs as invariably they are dug with balls of earth. Never purchase evergreen without a ball of earth to protect the roots from the air. If the roots are exposed even for a few minutes the sap in them will harden, being of a resinous nature and once it hardens the plant will promptly die. Dig the hole large enough for the ball of earth and plant it firmly. Set it not more than an inch deeper than it was in the nursery. Deep planting is fatal to nearly every kind of shrub or evergreen.

In the planting of deciduous shrubs dig your hole large enough to spread the roots naturally. Don't crowd and twist them to get them covered up. The hole should be large enough to lay them out as nature grew them. It will then be in shape to extend its roots in an ever widening circle. Twisted cramped roots cannot grow naturally and the shrub is retarded in its growth.

Do not mound up the soil around a shrub. Keep the surface level or even slightly depressed around the plants. Water will then sink down to the roots rather than run off as it is wont to do from a mound of soil. At planting time water thoroughly so that the rootlets have plenty of moisture to revive their partially dried condition. Plenty of water also aids in settling the soil around the roots and in making contact with them.

Fine dry soil over the surface or a mulch of some kind will aid in keeping the soil around the roots moist and help the plant start growth. Be sure that new planted shrubs and evergreens do not want for water. They do not need to be kept in a pool of water but they should have some moisture available at all times. If they are allowed to suffer for water just at this time they seldom if ever fully recover.

In planting deciduous hedges they must be pruned back even more severely than ordinary shrubs as not only must you make up for loss of roots but you wish to force the growth of new branches down at the base of the plants. If not pruned back severely the growth will be at the top and the hedge will never make base growth. This is the reason so many hedges in all sections of the country are thin and scraggly at the base. The planting or transplanting of all kinds of shrubs is comparatively simple but careful attention to these little details will spell the difference between success and failure.

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Marlac Trio

Our Special Assortment of colors White, Yellow and Pink. \$3.00 Postpaid

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Plan Now



but base your results on the condition of your soil

JUST remember this—to begin with, your garden is soil... only soil... and the manner in which you prepare that soil will positively determine how well satisfied you will be with the plants you grow.

Plants cannot move around to secure their food and drink, so the soil in which they grow must attract and store sufficient for their needs.

In their efforts to produce this soil condition, people often over-fertilize when they should properly condition the soil—make it physically correct.

Soil that is too largely sand, or too predominately clay, or garden loam that lacks organic matter and humus, is not in the right condition to produce good results.

Let us tell you more about this necessary basic starting point in our free descriptive literature. Small sample bale (about 2 bushels) \$1.50 postpaid.

A little Pioneer G P M Peat Moss dug into the soil like manure, each season, will keep it in healthy condition and produce better blooms.

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ROSES—Spring Planting

Several hundred thousand, two-year-old, low-budded, field-grown plants, in several hundred varieties, are ready for shipment at the proper season. Many are new and rare, among them are Mrs. G. A. Van Rossem, Lady Margaret Stewart, President Herbert Hoover, Everest the largest white rose, and the well known Etoile de Hollande in the Hybrid Teas group. Thelma one of the new dainty Pink Climbers, and many others. Also the wonderful Hybrid Perpetual Arrillega.

"Roses by Bobbink & Atkins," our special catalog, is profusely illustrated in color, describing and pricing the older favorite Roses as well as the newest novelties. Intelligent comments are given on the merits and demerits of the various varieties. All are classified and arranged to assist you in making a perfect selection. A copy will be sent to those who intend to plant Roses.

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A complete catalog of new and old-fashioned flowers, Hardy Chrysanthemums, Delphiniums, Marshmallows, Peonies, Iris, Phlox, Poppies, Rock Garden Plants in large variety. Beautifully illustrated. A table indicating Flowering Period, Height and Color is a feature.

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An illustrated catalog of Coniferous Evergreens, Evergreen Shrubs, Deciduous Trees, Flowering Shrubs, and Trees, Hedge Plants, Hardy Vines, and conservatory plants.

Our Specialties

Azalea Mollis and Pontica, Hardy Evergreen Azaleas, Chinese Magnolias, Cotoneasters, Japanese Maples, Rhododendrons, and Blue Spruce, grafted, Koster and Moetheimi varieties.

In your request for Catalog it is important to state definitely what you intend to plant, as we issue several catalogs.

BOBBINK & ATKINS

Nurserymen and Florists

Rutherford, New Jersey

You will confer a favor on us by mentioning this magazine

OUR OWLS IN FABLE AND FACT

(Continued from page 148)

red and gray color-phases. Its habits resemble in general those of its larger cousin, and its food consists largely of small mammals and many insects. Doubtless small birds are sometimes taken, but on one occasion pairs of house finches and chestnut-backed bluebirds were raising families in a dead pine stub in which was also nesting an owl of this species. The note is described as a mellow "whoot" repeated at regular intervals.

The hawk owl, *Surnia ulula caparoch*, is so called from its fancied sharing of hawk characters, but it is, of course, a true owl. It barely enters the United States, except as a migrant in winter, as it is a bird of the north, and with its old world representatives ranges around the northern hemisphere. There it is necessarily a day hunter, and the relatively small head and eyes, which seem to be correlated with this habit, mark it from the typical night-hunting owls. The food includes many of the small mammals of its habitat, especially mice and lemmings, and also ptarmigan and other birds. It nests in the hollows of trees, and also in open nests, usually those discarded by other large birds.



Our burrowing owl, *Speotyto cunicularia hypogaea*, is in many respects the most remarkable of our owls. By using for its home the deserted burrow of prairie dogs and other rodents of the treeless plains, this queer little owl is able to live in regions which would seem inhospitable to birds of this class. Since the burrowing owl in some form extends from the southern extremity of South America to southern Canada, including even some of the islands of the West Indies, and Florida, the list of animals whose burrows are utilized naturally includes a great many species. The nest is placed deep in the burrows and usually holds from six to ten eggs. The reputed friendly sharing of the burrow by the prairie dog, burrowing owl, and rattlesnake is of course a fable. As a matter of fact, the young prairie dogs help to support the owls, and these must sometimes lose their eggs to the rodents, certain it is that the rattlesnake preys to some extent on both of its neighbors.

But the burrowing owl by no means depends on its neighbors for food. Mice, ground squirrels, small reptiles, and some birds are among its stand-bys, and the larger insects, including many that are destructive to man's interests, are eaten in large quantities. Altogether, this little owl must be reckoned as one of our most useful species, and well deserving of the protection it usually receives. Formerly, however, it figured in the list of those killed extensively for millinery purposes, and even now, it is among those killed for bounty in those sections that still resort to this destructive and ill-advised method of destruction.

A forest-loving species is the pygmy owl, *Glaucidium gnoma*, whose eerie qualities are reflected in his specific name. It is a bird of our western country from the Mexican boundary northward to southern Alaska. Its general color is wood-brown above, with lighter spots, and the underparts are light, streaked with brown. It is our smallest owl.

New! Duckham's Delphiniums

NEW COLORS NEW TYPES—MASSIVE SPIKES

The latest productions in Giant Delphiniums from my famous Madison Gardens (to use the terms applied by many experts who saw them in bloom last summer) are "amazing"—"bewildering"—"phenomenal." Such exclamations are no mere "word gestures." The same expressions come to me in letters from all over the States from those who have bought my Delphiniums. The original English strains imported by me have been acclimated and improved by expert cultivation and hybridizing. Their size, vigor and uncommon colors are inbred by me in a thoroughbred stock, kept pure by careful "roguing." The highest awards that Horticultural judges can give, have been heaped upon them at leading shows, including gold medals at New York, America's greatest flower show. No Hardy Flower Border is complete without "Duckham's Delphiniums."

Prices For 1930

Large Field Divisions, embracing the complete color range from delicate lavender and mauve to deep indigo blue—Doz \$11 00; 100—\$85 00.

Selected Types and Colors, the world's choicest, Each \$2.50, \$5 00, \$7 50 and up—All field-grown.

Read the whole story of these amazing Flowers in my latest catalogue, Booklet N, mailed free upon request

WILLIAM C. DUCKHAM
Rose & Hardy Plant Specialist
BOX N, MADISON, NEW JERSEY

of wide distribution, but its prowess can not be measured by its size, for it has been known to overcome ground squirrels of twice its bulk. Mice, lizards, and insects of many species form its usual food, and it also preys on birds of various kinds, some of nearly its own size. Its standing with the small forest birds is indicated by the jeering, excited companies that gather when an owl is discovered in its daytime retreat in some shady evergreen.

The ordinary call is a succession of soft notes, somewhat like those of the saw-whet but lacking the metallic twang and uttered at shorter intervals. Other notes are described, one of which resembles that of the mourning dove. Sometimes the calls seem to be in the nature of a song, and may be given from a high perch during the daylight hours, especially on cloudy days, some of its hunting also is done in the daytime. The nest is usually in the deserted hole of a woodpecker, and the three or four white eggs are a little over an inch in length, about the size of robins' eggs.

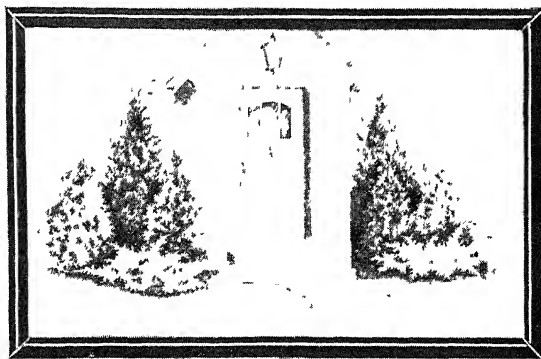
A truly fairy species is the elf owl, *Micropallus whitneyi*, the scientific name of which is given in allusion to the goddess of wisdom, to whom the owl was dedicated, and the common name in reference to its fairy-like form and elusive habits. It is the smallest of our owls, and one of the most restricted in range. So far as known, its range is nearly co-extensive with the giant cactus. The food of this little owl consists almost entirely of ants, beetles, crickets, caterpillars, and the small mammals of the desert.

In the deserted nesting holes of the Gila woodpecker, the gilded flicker, and perhaps some other species, excavated usually in the trunks of the giant cactus, the eggs are laid. The owl is thus practically dependent on the good offices of these carpenters, and on the presence of this picturesque tree. Several other birds also nest in the holes provided by the woodpeckers, and the scattered patches of giant cactus thus furnish homes for an interesting congregation of species that would find it difficult to persist if the cactuses were destroyed. This should be an added incentive to perpetuate as many as possible of these unique trees, which in themselves are nearly as worthy of preservation as the redwoods, or other more impressive species.

National Forest Survey

A comprehensive appraisal of existing forest supplies and conditions, growth and requirements, and of present and future trends, all of which, when properly coordinated, will constitute a fundamental and economically sound basis for determining Federal, State and industrial forest policies and programs, was authorized under the McSweeney-McNary Act of 1928. This survey is now getting under way with the appointment of C. M. Granger from the position of District Forester of the Pacific Northwest District to be forest economist in charge of the national program. Congress has authorized a Federal contribution of \$3,000,000 for the project, with a small mutual appropriation of \$40,000 available this year. The time has certainly come when we should really take stock of our forest resources that we may plan for the future.

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Everywhere Hill's Evergreens provide that added distinction and charm that one does not forget. It's a beauty that grows. Year after year its charm—and value—increases.

Here at Hill's we have specialized in Evergreen growing for three-quarters of a century. In our 600-acre nursery is every kind, in all sizes—the result of a world-wide search for new, beautiful varieties.

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Evergreens: Rhododendron, May, Kalmia, and Hemlock. Seedlings 6 to 18 in. 100 \$6 2 to 4 ft. 25, \$7, 100, \$15. (airload for \$150.00.)

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- 1 Waterlily (White, pink, yellow, your choice)
- 6 Water Plants (Our selection)
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All these for only \$3

If you want a tub add \$1

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A most delightful shrub of recent introduction. The bush is rather slow-growing and of medium height when mature. It blossoms in May and the flowers are as beautiful and as intensely fragrant as the Trailing Arbutus or Mayflower. Plants of this wonderful shrub are very scarce but we have a good supply at these prices:

18-24" plants
\$2.25 each \$20.00 per 10

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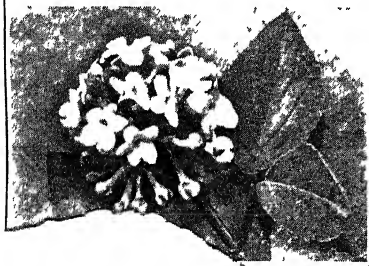
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VERMONT

plant, or
plants
De-
flies,
food
and

BAGGING THE BAGWORM

(Continued from page 166)

two weeks time netted twenty-eight pounds of bags—tubs full. These were kept in one corner of the class room for observation as a further part of the project. Parasites emerged. Eggs hatched and the habits of the baby bagworms were observed. Thus was the beginning of the history of the bagworm introduced to the pupils.

The superintendent of the city schools was much interested in the report given of this new project and asked that it be extended into all the grade and junior high schools in the system. Campaigns were organized in the schools. Teachers and pupils were introduced to the pest by the original investigators and acquainted with the facts collected by them. Soon research was going on in every building. Interesting data concerning the species of trees most attacked, parasitic control, and facts about the life history of the bagworm were obtained.

The boys and girls of the city collected 391 pounds of bags during this campaign, averaging about two thousand per pound. These bags were burned with ceremonies by the individual schools after some of the parasites had emerged. Some of the citizens followed the advice to spray the trees in which the bags could not be reached by the hand-picked method and killed many larvae as they hatched early in June.

Children began to prepare for the second campaign as soon as the leaves fell, though the dates were set for next March. The bags were gathered from all the schools and burned at a public bonfire at which representatives from each school were gathered.

An additional incentive was given to the third campaign, in 1928, when a group of the business men of the city, recognizing the worth of such a campaign to the welfare of the city, offered a silver cup to the school bringing in the most bagworms in each of the seven districts. A larger cup was also offered as a city prize. The enthusiasm that at once was put into action! Seven hundred and four pounds of bags were collected in Kansas City and vicinity. Boys had invaded the territory among the willows along the rivers from whence the bagworm migrated into the residential section of the city. The children had become "bagworm conscious." The winning school collected ninety-one pounds of bags.

Marked signs of the success of the former campaigns greeted the city in many sections when plans were made for the fourth attack in March, 1929. The campaign occupied about half the time allotted to the former ones. Again the business men offered prizes. All the schools were again represented in the program, gathering by the close of the campaign, a total of three hundred twenty-five pounds. Nature had failed. Over the warm weather necessary to the parasites. Kansas City needed help fight the enemy so the bags were set aside for several weeks to let the parasites to emerge before the burning campaign against the bagworm in May has been successful in many sections giving the children first-

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ODORLESS PLANT FOOD TABLETS

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Four to a gallon of water make rich liquid fertilizer—wonderful on lawns. Small box 25 cts; medium 50 cts, large \$1.00, professional size \$3.50. This is the only fertilizer GUARANTEED to improve plants.

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Japanese Rose Flowering and Weeping Cherries, Flowering Crab, in all varieties and sizes. Send for free book with color illustrations.

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Blooming size All different

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GLADIOLI OF DISTINCTION
1000, \$18.00; 100, \$1.90; 50, \$1.00

Not the ordinary field mixture, but a superfine collection consisting of such varieties as Anna Erbius, Baron J. Hulot, Crimson Glow, E. J. Maylor, etc.

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A selection of splendid varieties Jersey's Beauty, King Harold, Yellow King, etc. Products of our own nurseries

FREE WITH EACH ORDER of 12 Dahlias and 100 Glads 1 beautiful blooming size Azalea 1 baby Blue Spruce and 1 baby Norway Spruce

If you prefer send one-quarter of the amount of your order now and the balance to be collected on delivery of the bulbs

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Porter's favorite for attracting birds.
5 to 6 ft. \$1.50 3 for \$3, 10 for \$6
Catalog showing 85 varieties free

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hand information, the campaigns have done much toward educating the public at large and awakening it to its duty in civic projects such as tree conservation. There are also tangible results. More than seven hundred millions of bagworms were exterminated in the bags that were collected. The foliage of the trees is in better condition in late summer and less reserve strength is expended in growing a second set of leaves at that season than in former years.

It seems probable that in the not distant future boys and girls in the United States will wage a victorious war against injurious insect pests in behalf of their heritage of beautiful shade trees and pass them on to future generations with increased resistance to weather storms for years to come. Unless the children come in personal contact with the habits of the insect enemies in their communities and perform their bit of research, the lasting value of the campaign is lost. The duty of the school is to educate the future citizens concerning those facts assisted by organizations such as the Boy and Girl Scouts. The aggressive citizens of the communities and the civic clubs can boost the campaigns and foster this education for tree conservation.

Bag the bagworm and save the trees in which is written the history of the elements and of civilization. Help the parasites win the battle against the insect pests.

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NATURE MAGAZINE

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Prize Winners at leading American Shows

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SPECIAL COLLECTION (N)

	Present List Price
Trentonian, amber and bronze	75
Sanhican's Peach, peach cheek color	3 00
Sanhican's Gold, pale orange yellow	1 50
Roman Eagle, burnished copper	1 50
Margaret Woodrow Wilson, opalescent pink	1 50
Total List Value	8 25

Here is an \$8.25 present-day value (varieties that only a few years ago cost \$5.00 to \$10.00 each). Five great Prize-Winning Dahlias for **\$6.00**

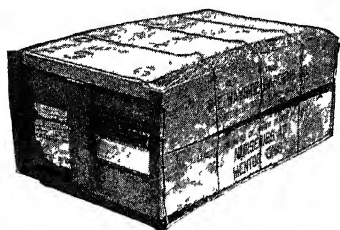
For the connoisseur who seeks the latest creations, we have several 1929 and 1930 introductions that have topped the list of Winners at the recent Autumn Shows. They are:

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It may sound like tooting our own horn considerably, but the fact remains that no one has such a wide variety of Rock Plants and Hardy Plants. Or sells such finely finished big husky clumps. They are packed with extreme care. That's one reason why we can guarantee arrival in good condition. If they don't we cheerfully replace any not top notch. And when we say cheerfully, we mean just that.

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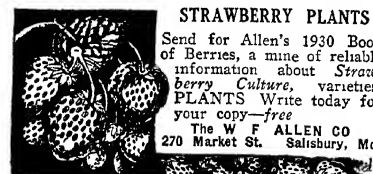
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Mrs. Edison on Nature

"Outdoor life and the great healing power of Nature seem to contribute most indispensably to contentment," writes Mrs. Thomas A. Edison in *Playground and Recreation*. Mrs. Edison is a life member of the American Nature Association. "People who lack close contact with them cannot be really happy, these things are too fundamental."

"We are facing a vast challenge, but I believe it can be and will be met. I like to look ahead to the time when every American city and town and country district will have opportunities for more and better play, will enjoy leisure time pursuits that build up the body and minister to the mind and spirit. One of the most important things this group can do is to show our young people that the best things of life are free, that they may be had without paying a cent. Bring our children closer to the simple and fundamental, help them to discover hobbies that they may keep all their lives, train their hands and hearts to the joy of creating perfect things, hold up to them ideals of fine sportsmanship, and we will have a better nation tomorrow."

Roadside Beautification

The nation-wide movement toward roadside beautification is gathering rapid momentum. In a recent statement, Thomas H. MacDonald points out that the planting of suitable trees and shrubbery along all highways of the Federal-aid system should be regarded as eventually necessary. Massachusetts maintains a state nursery for growing trees to be planted along new highways and has legislation preventing the cutting of shrubs and plants. Connecticut will spend some half a million dollars in the next few years on landscaping projects, and maintains a landscape division. Missouri employs a landscape architect and offers his services to civic organizations wishing to beautify their towns. In California, more than 680 miles of roads have been beautified by tree plantings. Other states lending a hand are Delaware, Georgia, Illinois, Kentucky, and Wisconsin. Difficulties appear in the Southwest, due to dryness of climate, and in the snowy regions of the Northwest, where trees cause snow to drift across the roads, but elsewhere the plans for pleasing the tourist trade and making the state beautiful to the visitor are being carried out apace.

Benton Lake Refuge

By Executive order, President Hoover recently set aside 12,234 acres at Benton Lake, Montana, near the city of Great Falls, as a bird refuge and wild life sanctuary. More than three thousand acres of the tract consist of water area, with abundant aquatic plant growth for cover and food. All hunting will be prohibited in the refuge.



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Roses respond amazingly to the cleansing, stimulating effects of Fungtrogen Spray. Mildew and Black Spot disappear. Foliage becomes bright and luxuriant. Blooms of rare, new perfection appear.

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The fate of a genius seems to be sad in whatever order of the animal kingdom he exists. His part seems to be that of Sybil, whose truthful utterances no one would believe, and even his actions are derided and laughed at. Man knows well what happens to the Nitzsches and Schopenhauers on Earth, but it remained for Ida M. Mason of New York to picture the reaction of the hornet mob to the architectural aspirations of another hornet who refused to follow the patterns laid down through endless generations.

"Outside our dining room window in the country," she writes, "we saw the building of one of those huge gray paper hornet's nests. It was fastened to the top of the stone window frame, so that it was easy to watch its progress each day. It was most fascinating to see the little workers pasting on row after row of well-chewed old wood material. These rows were about the width of a pin head, and each outer layer of the nest was about one quarter inch from the preceding inner one. As we watched day by day it seemed that each worker had his own section, and all was order and harmony. When the nest was about the size of a grapefruit, a leaf from the overhanging ivy touched a portion of the upper part, and to our amazement the worker that had charge of that particular section cemented that green leaf into the structure like a green glass window. It was done perfectly and all superfluous leaf was cut away, a marvel of workmanship and ingenuity. We could look from beneath, as this layer was not quite half finished, and see the green light through the window. Next morning at breakfast we noticed a lot of tiny green specks on the window sill. On going out to investigate we found our ingenious worker busily biting out his masterpiece that he no doubt had made with such pride the previous day. Evidently the inspector had 'bawled him out' for thus diverging from the hornet blueprint laid down centuries ago. There was the unappreciated genius working for dear life, undoing all his lovely work. After the green window was all out he patiently wove back and forth the old gray stuff such as his ancestors had used, and the stained glass window was a pile of tiny bits on the sill. The work was all finished by evening and not one hornet helped him though there were others pasting on the conventional stuff out of his territory. We are curious to know whether we are the only ones who have seen a hornet genius. Perhaps when his work was finished he was sealed up in a cell to die a martyr's death for daring to deviate from age-long plans of hornet architecture."

Kelleter Appointed

Wisconsin has selected Paul D. Kelleter, formerly of the Federal Farm Board, to serve as its director on the State Conservation Commission. The new chief was for twenty years a member of the United States Forest Service and brings to his new office a wide conservation experience. The Commission recently set aside a new wild life refuge in Oconto County to be known as the Archibald Wild Life Refuge. It was established on land of the Holt Lumber Company and comprises 3420 acres.

A Fall-Blooming Tree Of Unmatched Charm

White as winter's snows, a center of golden stamens, and a delicate fragrance, the blooms of *Franklinia* (*Gordonia*) are matchless in loveliness.

The flowers, about 3 inches across, open in mid-August and are produced continuously until frost. The tree is hardy, in protected situations, as far north as Boston, growing readily where rhododendrons thrive.

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Orders should be placed at once for spring shipping. Further description and details on request.

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FOR the first time in several years, the South has contributed some rather rare ferns to our extensive collection. Connoisseurs having rockeries will welcome these especially, for they are the pigmy folk of the fern world, growing from two to twelve inches high, depending on the variety. Here they are —

- Camptosorus rhizophyllus* (Walking Leaf Fern) 2-6 in
Pellaea atropurpurea (Purple Cliff Brake) 4-10 in
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The Flame Azalea is, perhaps, the most gorgeous of all Spring flowering shrubs. During May and June the plants are completely smothered by orange, yellow or flame-colored blossoms of brightest hues and diverse shades.

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1 to 1½ feet	\$2 50	\$20 00
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Our Florida Map

Under the caption "Maps That Get You Somewhere", the Cincinnati *Times-Star* does an editorial on the map done by Mr. Jex for the cover of our Florida issue in December. We republished the editorial herewith, both because we like to have such nice things said about us and because it also reflects our own views. Here it is:

"The cover drawing of the current Nature Magazine is a colored map of Florida, but it is not at all like other maps of the time. It is pictorial in an engaging and yet informative way. Set down here and there on a golden background are little sketches of animals, persons, and things, each of which is labeled. Among other items one notes a cormorant, an egret, a wild turkey, a pelican, a wintering duck, a burrowing owl, a cougar, a possum, a deer, a cow, a 'gator, a Seminole wigwam, a beehive, a clump of cypress, an orange tree, a bunch of sugar cane, a box of strawberries, a handful of tomatoes, a cluster of peppers, a watermelon, a cotton plant. The neighboring Gulf waters show a manatee coming up for air, a barracuda pursuing a bather, a peaceful red snapper, a sedentary sponge. Further phenomena pictured ashore are the silhouette of a batter and the legend 'baseball training camp', a glittering dime and under it the initials 'J D R', the Suwannee River with an African plucking a banjo, and a campfire on the Caloosahatchie with the forms of 'Henry, Harvey and Tom' grouped about it.

"While the magazine cover is intended to be humorous, it is about the best map we have seen that bears a later date than the Middle Ages. The old cartographers did things like this, to the entertainment and instruction of all. They were superseded by misguided moderns afflicted with the fallacy that cities are more interesting than people and things, and that mountains and rivers are not worth noting. The usual map of the time is a dicary thing cluttered up with the names of insignificant towns all very much alike, towns you wish to ride through in a sleeping car in the small hours of the night. It takes a magnifying glass to find what you want upon it. In behalf of the Renaissance of Wonder let us have more maps on the good medieval pattern."

Man's Origin

The birth of modern man was pushed back to at least 1,250,000 years by the recent pronouncement of Henry Fairfield Osborn, retiring president of the American Museum of Natural History, to the effect that the Piltdown man, *Eoanthropus dawsoni*, was the oldest known human ancestor. The Piltdown man has been constructed by scientists from a skull and jaw found at Piltdown, Sussex, England, by Charles Dawson in 1911, and has been considered to represent a much later state in man's development than *Pithecanthropus erectus*, the ape man of Java, long believed to be the earliest record of man. If Dr. Osborn is correct, man some 1,250,000 years ago had a brain capacity equal to the minimum of living Veddahs, Papuans and natives of the South Sea Islands, the most primitive men, so that the long ice ages brought no changes in the human brain, but the finishing touches to his development will bring out much argument.

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Biological Survey Report

That the first requisite in wild-life administration is an adequate knowledge of all the facts regarding the wild animals and birds of the country—their relationships and economic value, their habits, and their abundance—is stressed by Paul G. Redington, chief of the Bureau of Biological Survey, in his report to Secretary Hyde of the U. S. Department of Agriculture on the work of the Biological Survey for the fiscal year ending June 30, 1929. Only with such facts known, says Mr. Redington, can the wild life of the country be administered on a sound scientific basis and the harmless and useful species protected and those that are economically injurious controlled.

"Although economic considerations should by no means be allowed to outweigh all others that are advanced for the welfare of wild life," says Mr. Redington, "they have a proper place in every measure considered for wild-life conservation, for man must in many places subdue nature and make it serve his purposes. Fields must replace large forest areas, and domestic livestock must supplant most of the wild ruminants, predatory animals, and injurious rodents. In the process whereby civilization, either intelligently or wantonly, is changing natural conditions, the wild life, wisely preserved and controlled, can be made an asset of great value, not only of economic but of esthetic and scientific importance, and the natural habits of many species may themselves be utilized in numerous ways."

Goddess or Glutton?

Further habits and traits of Miss Phengodes, the subject of an article in October Nature Magazine by Samuel H. Derickson, are revealed by Mrs. Jesse E. Coriell, of Webster Groves, Missouri, who found the pretty little lady in the new rôle of a militant warrior. "It was a battle to death," she relates. "The long, drab millepede and the gaily dressed smaller 'worm' wrapped about each other and rolled about the glass where Skipper and Ginger had placed them. The war was still raging an hour later when it was time for us to leave camp, so Ginger put the contestants in a paper bag to carry in the automobile. Suddenly she uttered a cry, 'Mother, it's a glow-worm!' And through the paper, a soft glow showed the outline of the body of the black and tan 'worm'."

"At home, Ginger flew to the October Nature Magazine and checked point by point until Miss Phengodes was clearly identified. On her knees before the glass which had become a jewel casket, the child agonized. 'If the big one kills the small one, I'll never forgive myself for not separating them, but if the small one kills the big one, she will eat it and we shall know her natural food. What shall I do?' Scientific curiosity triumphed and the two stayed together. Morning light disclosed a new page in the history of Miss Phengodes for she was breakfasting magnificently upon millepede. The head had been bitten off and cast aside and, as she ate, the lovely glutton crawled inside the shell of her prey. Three segments had already been emptied. We dragged the glow-worm from her meal long enough to measure each. The millepede, without its head, was two and three-quarter inches and Miss Phengodes ex-



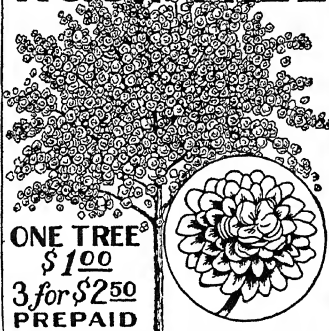
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tended and crawling was two and one-half inches long. When the two were replaced in the glass the meal was resumed to continue for three days and three nights. When only a half inch of the millipede remained, Miss Phengodes took a long breath and burrowed into the dirt which filled the lower half of the glass.

"To sleep off such a gluttonous meal seemed quite natural, but when two days passed and no glow-worm appeared, we became concerned. Careful examination of the dirt in the glass disclosed no glow-worm. We had under-estimated her length and strength and a pushed-up place in the paper which, secured by a rubber band, covered the glass, showed us the way she had gone."

Exotic Game Birds

W. L. McAtee, Senior Biologist of the U. S. Bureau of Biological Survey, has written a pamphlet entitled *Game Birds Suitable for Naturalizing in the United States*, published by the Department of Agriculture as Circular No. 96. In this circular Mr. McAtee discusses the species recommended for introduction and those considered undesirable, and makes suggestions as to habitat and method of naturalization. In his introduction to the circular, Mr. McAtee says:

"Sportsmen share the admiration of Nature students for native game birds and will cooperate to the fullest extent in preventing their extermination, but they see the necessity for using exotic species also if the game supply is to be maintained or increased. Such increase is widely demanded and will continue to be demanded, and to effect it necessitates the fostering of birds that respond most profitably to game-propagation methods. Where native game birds are abundant there is little or no need to plant exotic species, but where native species do not supply the demand, foreign game birds are being introduced. Let the native game birds enjoy the protection of game sanctuaries as numerous and extensive as can be afforded, but on those parts of our domain where public shooting is practiced and its continuance is desired, the practical necessities of the situation require the use of species of game birds that will produce the best results, regardless of their origin."

Park Nature Notes

One of the most successful features of National Park Service administration has been the issuance, from a number of the parks, of monthly bulletins under the title "Nature Notes." These contain interesting news items of happenings in the park, and feature articles on game, geology, or flowers, and besides being interestingly written, are extremely valuable from the scientific point of view. Yosemite, Crater Lake, Mount Ranier, Yellowstone, Rocky Mountain and Grand Canyon National Parks have issued such bulletins for some time, and Dr. G. C. Ruhle established the practice at Glacier. Individuals interested in receiving these bulletins may be put on the mailing list by writing to the superintendents of the parks. The cost of postage must be paid for Yosemite Nature Notes, but the others are distributed free of



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charge As an experiment, a number of mimeographed leaflets containing information on geology, wild life and other phases of Natural History were prepared at Crater Lake, and distributed to the visitors, who received them enthusiastically. It is interesting to discover that more and more attention is being paid to the educational features of the parks, and that the reaction of the public is decidedly favorable.

Report on Chipmunks

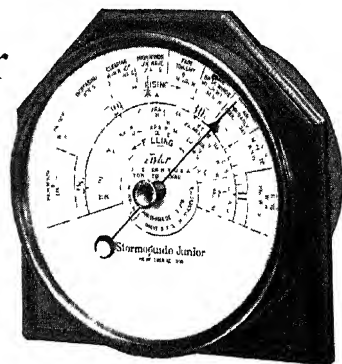
In the report entitled "Revision of the American Chipmunks," Arthur H. Howell has gathered together the latest information relative to the Genera *Tamias* and *Eutamias*. Speaking of the economic status of these animals, he writes that "the eastern chipmunks occasionally damage grain in the fields and dig up and eat corn and other planted seeds, but in the main their habits in relation to agriculture are neutral. The western chipmunks, living as they do largely in mountains and the wilderness, remote from agricultural sections, also are mainly neutral in their relation to man's interests. Occasionally, however, where their habitat borders on cultivated fields, they do some damage locally to crops. They sometimes prove troublesome on areas that have been planted for reforestation by eating the tree seeds. If chipmunks are abundant in regions where forest planting is being carried on they frequently eat or carry off a good share of the planted seeds, and it has been found necessary in order to insure a successful stand first to reduce the numbers of chipmunks by trapping or poisoning. Under natural conditions they apparently have no harmful effect on forest growth."

Copies of the new report, North American Fauna No. 52, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 35 cents each.

A Battle Royal

An unusual struggle to the death between a tarantula and a tarantula hawk is recorded by Miss Winnie L. Wheeler of Tucson, Arizona. When discovered, the tarantula was taking an evening stroll on the walk, while the hawk was hovering nearby. The hawk, or wasp, began to walk around the spider, although beset by the difficulties of water on the walk and grass nearby—then suddenly she flipped herself on her back, pushed herself underneath the tarantula and stung him. The tarantula tried to fight back, but the wasp quickly got beyond reach and, after nursing her wounds for a minute or so, was back at the attack. Again she performed her stinging act, preceded by circling the tarantula and teasing him to attack. This time the tarantula hardly fought back and soon became motionless. The wasp walked some distance away, cleaned herself thoroughly, then started off in a definite manner toward the grass. Soon she returned, and grasping her fallen foe, she began dragging it backwards. She crossed the walk, then started for the other side of the street. Many adventures she had in making the journey, but Miss Wheeler and her friends saw her safely reach the other pavement and disappear into the grass, with her conquered victim rudely dragged behind.

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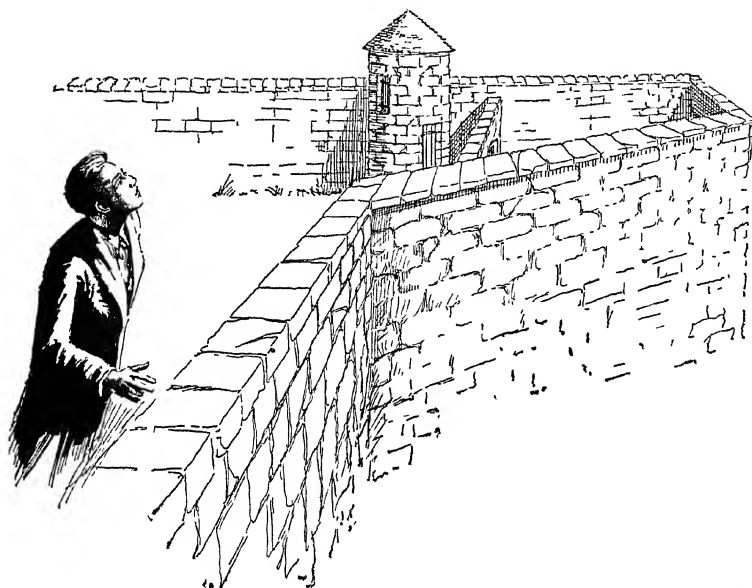
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California Quail Victorious

Twenty-two birds were selected as eligible for the honor of being designated as State Bird of California and were placed before the people of the State, without prejudice and on an equal basis, by the California Audubon Society. Then there ensued an excellently administered poll for the selection of the favorite bird. With a total of about 150,000 ballots cast and sent in, the California quail was a safe winner when the voting closed, getting about one half of the total cast, with the balance variously divided among the other contestants. Naturally the poll has been of outstanding educational value in the State and has awakened widespread interest in birds and bird protection.

School of the Air

It has just come to our attention that a fine educational activity is going on in Ohio under the title of the "School of the Air." The last Ohio General Assembly made a special appropriation to cover a two-year program under the State Department of Education for the broadcasting from Station WLW, Cincinnati, subjects of grade and high school level. This takes place from two to three on the afternoon of each school day, twenty minute periods being devoted to each subject. Mondays from 2:20 to 2:40 the Nature period is presented. Many schools have installed receiving sets and have enrolled in the new educational activity, which has most interesting possibilities.

Wild Rice

Miss Charlotte Riemer gives below an interesting account of one of the legends concerning the discovery of the food value of wild rice.

"In visiting the lake region of northern Minnesota we saw great quantities of beautiful, feathery grass growing in the thousands of lakes for which that section is noted. It swayed in the breeze, reminding us of fields of grain on dry land, and when we asked our Indian guide what it was he said 'wild rice,' and later he told us a very interesting legend about the discovery of wild rice.

"Long ago a young Chippewa brave set out to spend some time in the wilderness where he would be cast upon his own resources for food and shelter and protection. This custom was followed by many of the young men as it taught them to depend upon themselves and to become self-reliant. This youth wandered in the forest for many days, subsisting on such food as Nature yielded and upon the flesh of the animals he was able to shoot or snare.

"After a time food became scarce and he was forced to eat some unknown roots which made him very sick. After that he was exceedingly careful what he ate and he sometimes went hungry rather than to eat strange fruit and tubers.

"One day he came to a lake in which was growing a strange, feathery grass. He was attracted by the beauty of the plant and as the lake was too deep and muddy

for him to wade into the water he fashioned a canoe from the bark of a birch tree that grew on the bank of the lake and paddled out upon the water and gathered some of the grassy stalks. He had never seen the plant before or heard of it so he did not know it was useful for food, but he admired its graceful beauty and gathered some of it to take back to the tribe. Later the squaws planted the seeds of the grass in another lake near their wigwams that they might all enjoy its beauty.

When the rice which the squaws planted had grown to maturity a very wise old Indian, who had traveled much, visited this particular settlement and when he saw the wild rice he cried, 'Manomin, Manomin'. And then he told the Chippewas that Manomin (or wild rice) was good to eat. "To-day many of the lakes and swamps of northern Minnesota yield prolific harvests of wild rice which the Indians go out in boats and gather. A canvas is spread in the bottom of the boat and the waving stalks of rice are bent over the edge of the boat and beaten on to the canvas with sticks.

"Most of the rice obtained by the Indians is sold to the summer hotels which abound in that region. These 'resorts' are much frequented by tourists from all over the country who come there for the fishing and hunting season and to enjoy the delightful summer climate. The hotels serve the rice to the tourists at exorbitant prices for the tourists consider it a great luxury when well cooked and served with game and other meat dishes."

Skeleton Leaves

We are indebted to W. J. Edmonds, Jr. of Whitehall, N. Y., for the following information on preparing skeleton leaves.

A method of preparing skeleton leaves quite as efficient and not so offensive as the old method of maceration is as follows:

First, four ounces of ordinary washing or sal-soda crystals are dissolved in sixteen ounces of boiling water, to which is added two ounces of slaked lime, then the mixture is boiled for fifteen minutes and allowed to cool. After cooling the solution is filtered into another container. This clear solution is allowed to come to a boil and the leaves are carefully immersed in the same and allowed to boil for about one hour, water being added from time to time to compensate for the water lost during the boiling.

The epidermis and cellular tissues of some leaves will more readily separate than others. Should they not rub off easily between the fingers, the leaves should be allowed to boil longer. When the fleshy matter is found to rub off easily between the fingers each leaf should be separately rubbed beneath cold water until the complete skeleton is exposed.

After the above process is carried out, the leaf skeletons will be found to be of a dirty white color. To make the skeletons a clear white color they may be bleached in a weak solution of chloride of lime.

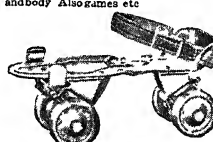
A tablespoonful of chloride of lime is added to a quart of water to which a few drops of acetic acid or vinegar are added to liberate the free chlorine. The dirty white skeletons are placed in this solution for a few minutes

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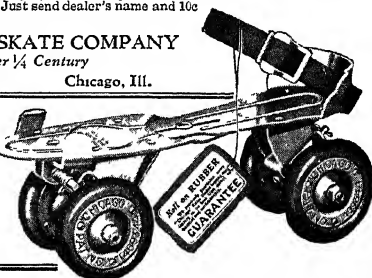
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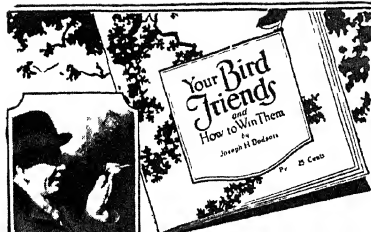
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or until the skeletons show up clear white,
and then removed, washed and placed be-
tween two sheets of white blotting paper
and allowed to dry.

The specimens may then be mounted upon
a card or sheet of white paper by means
of a mucilage made up of gum arabic, one
ounce, water, one and one half ounces, and
corrosive sublimate, two grains.

Care should be taken, in collecting leaf
specimens for this purpose, for the time
of year and the condition of the at-
mosphere must be considered, otherwise
failure will result. The best months in
which to collect the leaves for this purpose
are the months of June, July and August.
The leaves should not be collected in damp
weather and nothing but mature leaves
should be taken.

Saving Trees

Occasionally it happens that an in-
experienced person is called upon to play
the part of a doctor to save human life,
but less frequently does the layman attempt
to practice the art of the tree surgeon in
saving trees. Mrs. Horace P. Cook of
Anderson, Indiana, however, used a little
of that rare commodity, common sense, to
preserve a beautiful *Catalpa bungei* or
umbrella tree that stood in her yard. A
large branch had been broken from it and
was hanging by the bark. A tree expert de-
cided that amputation alone would be
efficacious. Mrs. Cook, not wishing to lose
the limb, bent it back into position, first
tucking all the splintered wood inside the
bark, then fastened it in place and bound
the wound with bicycle tape. She covered
the entire patch with sticky material to
keep out insects.

In a few days, the leaves began to wilt,
and some of them came off, and she deemed
her experiment a failure. A little later, how-
ever, the withered leaves came back to life,
new ones replaced those that had fallen, and
Mrs. Cook knew that the limb was healing.

Her experience has led her to believe that
many times valuable trees are cut down and
destroyed when a little practical surgery
would save them. Orchards particularly
suffer from windstorms, and the broken
branches could be mended, she thinks, by
the method she followed with her own tree.
It is a matter, she has found, of common
sense.

Playful Snakes


Snakes are usually pictured as very
sombre creatures, plotting from birth the
destruction of the human race, as did one
long ago, but the observations of Gertrude
A. Heath of Hayden, Arizona, may go far
to dispel the long existing stereotype. One
day in fall, she and her brother discovered
a beautifully marked green, white and
black striped snake basking on a board in
the sun. Hardly had it been found, than
another of the same species appeared, and
pounced on the first. The two rolled and
tumbled around like a pair of puppies
playing—first one tried to tie the knots about
the other, then they would become an en-
twined ball, then they would cease
the struggle and stretch out on the board
in the sunlight. This inaction would dis-
appear in a flash and again the battle



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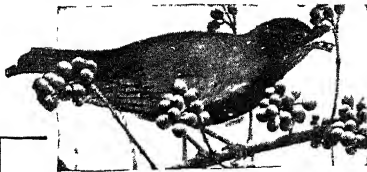
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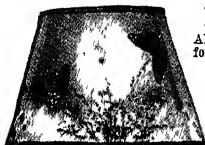
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would be on, until time for another rest. A third and fourth snake appeared in due time, and all was merriment for some moments until, disturbed by human-caused sound, they disappeared. But not for long, for soon they were back, and the play went on, with four contestants now. It was not until thoroughly wearied that they stopped. Then one slipped away through the grass, and the other three stretched out side by side to have a sun bath.

Bay State Bird Work

Mr. L. Raymond Talbot, who will be remembered as the author of our series of foreign bird-travel stories, is now working in the schools of Massachusetts for the Massachusetts Audubon Society. He is kept busy lecturing but does find time to issue a little pamphlet called *Bird News for the School*. This is distributed by the Massachusetts Audubon Society to all High and Junior High Schools of the State.

A Convenient Fertilizer

House plants may be made to thrive by properly feeding them with a new fertilizer. This is in the form of little white tablets which are clean and odorless, called Plantabbs. One of these little tablets is equal in plant food to a large garden fork of manure. One inserted in the soil of a pot once a week will make plants flourish surprisingly. They are equally valuable around roses and other plants in the garden, also along rows of flowers and vegetables.

Self-Starting Outboards

An important development in outboard motor history is made by the Outboard Motors Corporation, producers of the Elto line, who have added self starters on two of their outboard motor models. Any who have cranked and cranked, or pulled the cord attached to the flywheel for minutes on end, will appreciate the convenience of the new development. Elto also is building a new light model—weighing but twenty-nine pounds, which folds up to the size of a minnow bucket, and will be ideal for quick trips in small boats.

Beavers as Conservationists

In Harriman State Park, New York, beavers have given ample demonstration that as conservationists their rating is high. A series of their ponds is located on Stillwater Creek and is visible from the Seven Lakes Drive, the main motor highway between Bear Mountain and Tuxedo. The swampy forest flooded by these lakes became the haunts of many ducks, among them the rare woodduck. The shallow ponds, protected by the dams from invasion of voracious larger fish, gave safety to fry and larger young of species of fish. The beaver have been moved, as they were out of food supply, but willows, alders, lars are to be planted in their former sites, and as soon as these are set, food, they will be invited back.



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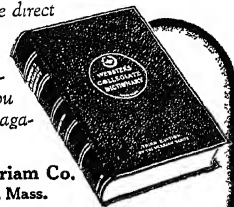
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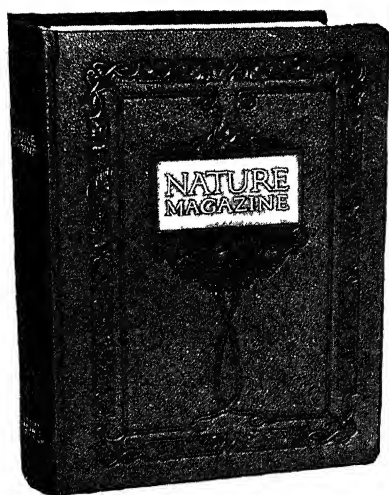
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STEPHEN TYNG MATHER

Just fifteen years to the day after he became officially connected with the National Parks as assistant to Secretary of the Interior Franklin K. Lane, and barely more than a year after ill-health forced him to resign as Director of the National Park Service he was instrumental in creating. Stephen Tyng Mather died at the Corcoran Hill Hospital at Brookline, Massachusetts at the age of 63. His sudden death on January 22 took place during the height of a nation-wide "Stephen T. Mather Appreciation" movement, designed to create in one of the National Parks a memorial in national recognition of his great service.

Stephen Mather is probably more responsible than any other single person for the National Park system of today. When appointed in 1915, the parks were inadequately administered as a part of the miscellaneous work of the Office of the Secretary of the Interior; they were not appreciated by the nation, there were no suitable facilities for their enjoyment by the people. He developed an orderly system of administration and with uncanny accuracy picked men of loyalty and vision to superintend the parks. A trained newspaper man, he saw the value of educational publicity, and succeeded in arousing the public from apathetic ignorance of the parks to become defenders of their integrity, and constant visitors. His enthusiasm carried private capital into the parks to provide suitable transportation and living quarters. When private enterprise threatened any of the beauties of the parks, or when additional sections were considered essential to the Park system, his personality and eagerness were successful in enlisting public and private aid. He fought endless legislative battles for the parks on Capitol Hill. And it is said among his friends that no one yet resisted Steve Mather when he came to get money for his parks. He gave hundreds of thousands of dollars of his own fortune to buy much-needed areas, later to turn them over to the Government. Part of Sequoia National Park and the site of the Tioga Road in Yosemite Park are monuments to his generosity and love for parks. During his directorship from 1909 to 1929, seven new parks were created, among them Grand Canyon, Zion and Acadia, and the Shenandoah and Great Smoky Mountains projects approved by Congress. He was President of the National Park Association. Mather graduated from the University of California in 1887 to go to the New York Sun as reporter, then left that field to become interested in the borax industry, which remained his concern until

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he turned his entire attention to the Parks He has been the recipient of many honors during his lifetime, among them the Cornelius Amory Pugsley gold medal for outstanding public service in National, State, county and municipal parks in 1929

During the past few months his friends, desirous of paying tribute to him, have been adding to a proposed \$150,000 fund, to be expended in a testimonial to him A gate at an entrance to Yosemite or a chapel in Yosemite valley has been proposed, and a national committee of 262 members is established to receive the flood of gifts. Those who knew Mr. Mather, who admired his sincerity, his wholesome idealism, and who fell under the influence of his single-heartedness and love for the out-of-doors, will now more than ever, wish to take part in the movement, but they will feel that after all, he created his own monument, which will never be destroyed—the National Park System, and for this the entire nation will ever be grateful

P F H

Dallas Lore Sharp

The passing of Dallas Lore Sharp, so doughty a warrior for open spaces both of the field and of the mind, has reduced to startlingly small proportions that little band of leaders who ushered in the twentieth century His beautiful personality and keen intellect left a deep impress on the country at large, his brilliant pen made thousands of friends for Nature

In many ways, Dallas Lore Sharp was more the brother of Thoreau, Whitman and Burroughs than of the age of mechanization He turned away from the present mill-race of civilization to find solace in Nature and wisdom in her teachings He rebelled with all the force of his vigorous pen against modern standardization in thinking, acting and living, and many fortunate enough to be his students at Boston University will carry the stamp of individuality he impressed upon them through life Mullen Hill, his home in Hingham, Massachusetts, early became a mecca for naturalists and educators, and his influence was spread to all corners of the nation

He began public life as a minister in 1895, but before the turn of the century had left this field to teach From 1909 to 1927 he was at Boston University, where his lectures were the most popular of all His deep love of Nature led him to express the results of his close and accurate observations in books, and a national reputation was built up within a few years Many a schoolboy is familiar with "Wild Life near Home", "Watcher in the Woods", "Beyond the Pasture Bars", and a host of others "The Boy's Life of John Burroughs" and "The Seer of Slabsides" are probably his most famous books

Nature Magazine had the privilege of carrying several of his articles, with drawings by R Bruce Horsfall, who illustrated also many of his books The last article,

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which appeared in May, 1929, shortly before he was taken ill, concerned Mulliken Hill He wrote then, "There is much room now within the house The table is still crowded sometimes for Thanksgiving dinner By tea time, however, there are only two of us, only she and I, for the long evening by the open fire Outside is the old November wind in the leafless trees Up in the tower of the house we are likely to hear the whimper of the little owl"

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A Friend Passes

Our birds have lost a fine friend and the country a valued citizen with the passing of Edward W Bok His career and his achievements call for little mention, here, so well are they known to Americans It is particularly fitting that this philanthropist should find his last earthly resting place by the base of the beautiful Singing Tower and in the embrace of the bird sanctuary which he himself had created near Lake Wales, Florida Few more lovely spots exist in this world

A Sportsman

President Hoover gave further evidence of his true sportsmanship late in January by refusing to take advantage of a bill introduced into the Virginia Legislature to permit him to fish any season of the year in Rapidan River, which flows by his Virginia mountain camp In advising the Legislature that he appreciated the courtesy, he said he had no intention of fishing except when others could fish

The Original Etching of the Singing Tower

in the December issue was etched specially and exclusively for Nature Magazine by Benson B Moore, noted wild life etcher So far as we have been able to discover it is the ONLY ETCHING OF THE TOWER in existence Thirty-five proofs were taken of this etching and the plate destroyed There are left available nine proofs, all signed by the etcher

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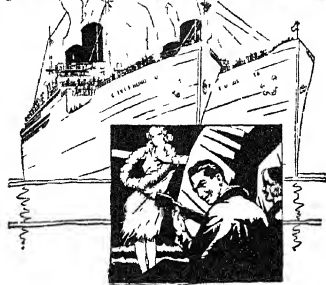


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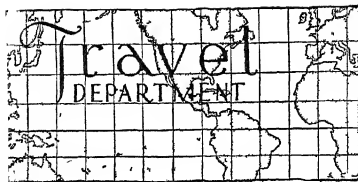
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* * *

The Royal Mail Steam Packet Company is offering an unusually attractive pair of Easter tours to Bermuda These have minimum prices of \$94 for the eight-day trip on the *Araguaya*, and \$100 for the nine-day voyage which the *Arcadian* is to take Four and five days respectively are allowed ashore, hotel expenses paid The sailings are April 12 and April 18 from New York Anyone who has not seen Bermuda should surely take advantage of this special offer

* * *

Sweden will be the scene of almost unprecedented activity during the entire summer The mammoth gymnastic meet in Stockholm, Sweden, in which 12,000 Swedish athletes will drill, undoubtedly is to be a drawing card for Americans, especially since the Swedish system of gymnastics is such a fundamental part of the education of the youth of the Nordic nation The results of the rigorous training undergone by Scandinavians have been seen in the most recent Olympic games, Stockholm will also be the scene of a great singing festival, to take place on July 5 and 6 in connection with the modern industrial arts exhibition, and some 7,000 Swedish vocalists and about 500 Swedish-American singers will participate

* * *

If one is to see Europe this summer, the American Express Travel Department will make, on request, an almost unlimited number of suggestions, and their valuable booklets, "The American Traveler in Europe" and "Quality Tours to Europe", will be extremely interesting The Express Company is now trying to help those individuals who wish to travel independently yet also desire that freedom from bothersome details which a tour affords It likewise offers numerous tours to every corner of the continent designed to fit any pocketbook or any whim of the owner thereof

* * *

See Page 208
for
Recommended Summer Camps



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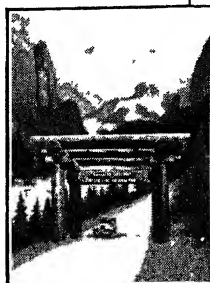
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While Russia is still on the bad books of the Diplomatic Service, it is becoming more and more gathering point for Americans of a better class who wish to know something besides what they read in the newspapers. It is fairly easy now to get into Russia, and safe to travel there. The Soviets are anxious, likewise, for the world to know what they are doing, so one can easily arrange to get a real view of Russian life. Irrespective of political philosophy, a program that extends over one-seventh of the earth's surface has sufficient interest to attract many citizens of the United States. Moreover, a trip to Russia is indeed off the beaten path and decidedly "different."

* * *

For those planning at this time for the summer vacations the Middle Western States, Wisconsin, Michigan and Minnesota, deserve consideration. This tier of commonwealths is the subject of another special number of Nature Magazine in May, and has recreational possibilities that are too little known. In the "Land of Hiawatha," the Upper Peninsula of Michigan, are a superb summer climate, fine fishing, great scenic beauty, and great wildernesses designed only for the sportsman and the out-of-doors lover. Minnesota, the land of 10,000 lakes, offers as much. One of the most marvellous trips in the world is a canoe trip over the old routes of the fur-traders to the Red River. The Wisconsin river and lake country is, in many spots, as untouched and primitive as the High Sierra, and utterly different. The Land of Sky Blue Water, as this section of the nation is called, will make up for winter's devitalizing effects.

* * *

With bookings daily being made for the American Nature Association trips to the West, the interest of Nature Magazine readers in these novel informal jaunts through the Parks is quite apparent, and the success of the idea is assured. In fact, it is recommended with all seriousness that those contemplating such trips in 1930 immediately make reservations, as the number that can go is definitely limited. The Inner Passage yacht trip is especially popular.

Nature Guide School

Announcement is made of the courses and plans for the 1930 summer session of the Nature Guide School under the leadership of Dr. William Gould (Cap'n Bill). Vinal to be held at Hudson, Ohio, this year. A bulletin descriptive of the courses and credits, and the general program and objects of the school has been published by Western Reserve University and can be obtained by all interested by writing that University at Cleveland, Ohio.

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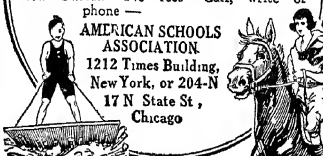
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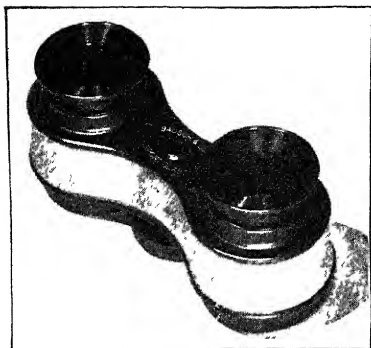
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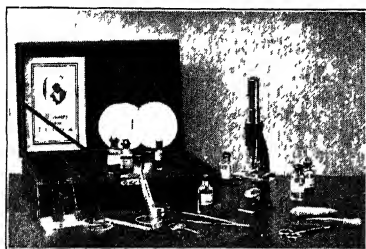
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So interesting are the pictures which Mr. Hugh Spencer has made for the article on the spring peepers that we asked him to give us a little idea of how they were done. He complies by saying that "the photographs in this series were all made in the studio with exposures of from five to fifteen seconds. The little frogs will usually 'pose' in almost any position long enough to allow a full exposure. It is not so easy to persuade them to assume the exact position and facial expression desired. We begin with a small lump of modelling clay about the size of our frog and place it on the table or in whatever place we want our frog to sit. The camera is then carefully focussed and the shutter set and slide drawn. The next step is to get our real frog to replace the dummy.

"In handling the little frogs I have found it most convenient to use the handle of a penholder or tip of a blunt pencil. By slipping this under his throat and gently lifting him he can be persuaded to take hold of the pencil with his front feet and can then be lifted up and moved to the desired point in front of the lens. While carrying him about on the pencil it may be slowly revolved backward and this will keep him so occupied trying to keep right side up on top that he may not think of jumping off. After we get him in position it may still require some coaxing with the pencil to get just the right attitude and then, before he has time to make up his mind which way to jump we seize the bulb and make the exposure. Sometimes, of course, he will jump too soon and then we have to gather him up and go through the whole performance a second time. The camera used was a view camera with long bellows which permits of making the pictures actual size or even larger."

* * *

A new 16 mm motion picture of reasonable price has been placed on the market and boasts several new features. It is known as the Pekoscope and is the product of Peko, Inc. According to the announcement it can be operated from an automobile battery in camp or wherever you wish, and packs up compactly for carrying about in one's equipment. It is listed at an F O B price of \$42.50 with a guarantee of one year.

* * *

We have had a number of inquiries asking us what kind of camera was used to obtain the mountain lion pictures which illustrated our leading article in February. These pictures were taken with a Bell and Howell Eyemo motion picture camera. Our expeditions are equipped with a catholic group of cameras—Graflex and Eastman for still work and several motion picture cameras so that there may be no delay for loading.

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The February issue of *The Cini-Kodak News*, published by the Eastman Kodak Company, appears in new dress of most attractive typography and layout and with a different treatment of its editorial contents. This issue appoints all users of amateur movie cameras on its editorial staff and appeals to them to say what shall go into the publication each month.

* * *

Good suggestions for those doing any commercial photography and announcements of all sorts of things photographic are to be found each month in *The Revo Bulletin*, published by Burke and Jarvis, Inc., 223 West Madison St., Chicago. Those photographically inclined should write for a copy.

Old Faithful

Members of the American Nature Association parties that visit the West this summer will see many wonderful sights, and those who are members of the Yellowstone trips will, of course, see Old Faithful in operation. The recent issue of *Yellowstone Nature Notes* says that many have viewed Old Faithful and have attempted to express their reactions in various terms. One tourist exclaimed, "Gee, it's just like a firehose." But, the *Notes* continue, "Occasionally the person who views the beauty, majesty, and grace of this column of water and steam which is projected night and day, winter and summer, at fairly regular intervals, is forced to write and attempt a description of the phenomenon. There recently came to our attention the best description we have seen yet after having witnessed over 500 eruptions. It was a letter in which this was written:

"I can't come to the Park next summer, but I shall think of the *most* lovely Old Faithful—rising with her eternal youth and infinite grace—oh, how I want to call her "Aphrodite." "Old Faithful" is too prosaic for such ever-youthful loveliness. I see her so many times rising in that wonderful grace, flinging her spray in perfect abandon, then gracefully lowering that regal crest, flinging her jeweled robes in a final gesture before the low bow—and exit! Never have I seen anything so lovely—so ethereal!—and then to be called "Old Faithful!" It's a travesty on beauty—that's sure."

To Elmer Reynolds

Few newspapers in the country can vie with the Stockton, California, *Record* with a record of championship of the National Parks and preservation of outdoor beauty. And it was the direction and vision of Elmer Reynolds that were reflected in the pages of his paper in this work. It is, therefore, a most happy movement that is on foot to establish to his memory at Silver Lake a Nature lore museum. The Elmer Reynolds Memorial Association has been formed and already contributions are coming in toward the total of \$5,000 sought for this memorial. Mr. W. C. Neumiller, treasurer of San Joaquin County, whose address is Stockton, is treasurer of the Association.



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MR. Roberts, one of America's most famous art photographers, who has some 70,000 photographs to his credit, says:

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NATURE MAGAZINE is published monthly by the American Nature Association
Entered as second-class matter May 31, 1927, at the post office at Washington, D C
Additional entry at Greenwich, Conn

*Subscribing Membership
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back pages of the magazine*

Publication and Editorial Office, 1214 16th Street, N. W., Washington, D C

Additional Offices of Publication, Greenwich, Conn

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THE YELLOWSTONE PARK BOUNDARY

An Editorial

VIGOROUS controversy has raged over Yellowstone National Park boundaries for eleven years. It still rages while a special Boundary Commission, sanctioned by Congress and appointed by the President, considers its decision. It is a complicated question. Directly involved are the state governments of Wyoming, Montana, and Idaho, the United States Forest and Park Services, game hunters, lumbermen, dude-ranchers and those who demand no cutting into Park boundaries. Indirectly involved are the United States Biological Survey, moose, elk, and other wild life, and policies of Park management.

Three things confront the Commission. First, should a fan-shaped area of three hundred and forty square miles be added to the southeast corner of the Park to include therein the headwaters of the Yellowstone River? Secondly, should the Snake River, on the south, be made the boundary and the notches south of it eliminated? Should Bechler Basin be cut from the southwest corner for reservoir purposes?

Yellowstone Park was set aside originally as a rectangle. Its boundaries were arbitrary, not natural. From an administrative point of view they are difficult. Last year the east and northwest boundaries were changed to create natural boundaries. The Snake River elimination and the addition of the southeastern area, known as the Thoroughfare Country, are in line with this program.

The Thoroughfare region is ruggedly beautiful, most of it eight thousand feet above sea level. Its timber is sparse and inaccessible. It is rich in moose and elk, marten and mink. Game Preserves of Wyoming fringe the East boundary of the Park, and the Teton Preserve the South. This region is, therefore, the last available hunting country adjoining the Park, and yields Wyoming revenue in licenses and its citizens profits from outfitting parties.

Lumbering, hunting and sanitary considerations complicate the Snake River plan. If the land in question is out of the Park, the Park Service no longer controls the southern bank of the river and is powerless to prevent the floating of logs. This change would open up considerable timber not now accessible, and river-driving operations might take place along a National Park boundary.

Elk summer in the Yellowstone highlands. They drift down to Jackson Hole in the fall, many crossing the notches which, if eliminated, will become public domain. Although they are now protected in the Park and the Teton Preserve, they

could be shot by elk hunters on this public land unless the State of Wyoming should add it to the Teton sanctuary. The State may or may not do this of its own accord, and no bill affecting this area should be passed unless it provides that the tract remain under game regulations similar to those of the Park Service until made a preserve.

Typhoid broke out in Gardiner at the north entrance of the Park, a few years ago. Park visitors carried it as far east as St. Paul. The Montana government could not cope with its spread nor control the water supply. This example shows the need of the Park Service retaining control of Snake River. A typhoid epidemic may never come. It may strike next summer.

For eleven years the Bechler Basin has been sought as a reservoir site for Idaho irrigation projects. This is a beautiful stretch of meadow set in the southwest corner of the park. To the southwest is the Teton Basin outside the park, also a possible watersite, although admittedly more expensive to develop. So a strong Idaho element is seeking the elimination of Bechler Basin. The Department of the Interior, the Park Service and Congress have consistently opposed this change. Two issues are involved: are Bechler's beauties of National Park standard, and should a large area be taken from a National Park for agriculture when an alternative relief is possible?

Wyoming feels she has given enough. She gains no revenue from park exploitation, no taxes from 3,426 square miles of what might have been her territory. Elk molest her farmer's haystacks and tramp his fields in the Jackson Hole country. More and more of her range land is being bought up for elk winter feeding grounds, and turned over to the Government whence comes no taxes. She wants no further carving of her territory by the park.

Thus, in substance, is the Yellowstone Boundary problem. The American Nature Association urges careful thought upon it. The equities of the situation, it strongly feels, are with the people of the nation, instead of those of a state, are with the game, rather than with the hunters. They are with the park-lovers, not with the irrigationists. Precedents involving elimination of park land, unless the areas are definitely and conclusively proved not to be of park standards are dangerous. And a precedent involving, as in Bechler Basin, the carving of a park to relieve commercial enterprise that has not yet exhausted its remedies is most dangerous of all.



“ COMES THE CHEERLESS NOTE OF A PASSING RAVEN ”

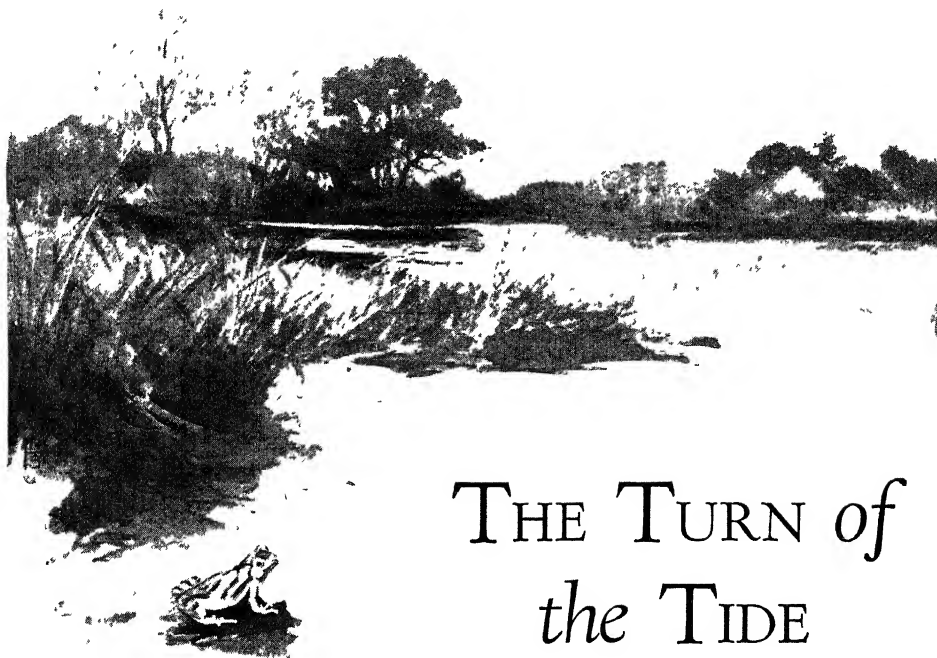
NATURE MAGAZINE

Volume 15

Number 4

April

1930



THE TURN of the TIDE

by E Chesley Allen

DOWN in the southwestern end of Nova Scotia, nestling among the hills at the head of the Chebogue River, lies the little village of Arcadia. Here, twice daily, a small fragment of the mighty tide wave that flings itself against our iron coast must work its tortuous way through miles of sedgy salt marsh before it can hold belated tryst with the fresh waters of the little brook flowing out of the woods above the village.

So to our little province comes the Spring. The great tide of awakening life surging northward over a vast continent must pause here until the inimical forces of the north, with their flotillas of icy monsters off our shores, are defeated and dispelled.

BACK in the nineties, in the little village of Arcadia in western Nova Scotia, the Allen family were chronically disturbed because the cows were not gotten in from pasture for milking time. There were two causes—their small son, intrusted with this task, and Nature. The song of a white-throat, the drumming of grouse or the whirring of a Wilson's snipe all submerged any cow-herding urge. But the boy grew up and we now welcome him to the pages of Nature Magazine for the first but not the last time. A teacher in grade schools, high schools and normal school, he has carried with him his love for the outdoors. For the past seven years Mr Allen has been superintendent of the Halifax School for the Blind, but his Nature interest has found expression through radio talks under the provincial educational department and the written word. His is the happy faculty of writing charmingly about things eminently worth recording, and putting in print

But now it is mid-February. The very sky itself is a cold, lifeless drab, shading down to a horizon of leaden blue-gray. It is the season of great silence in the north. A momentary breath of air rustles the dry, dead leaves still clinging to a beech, while from high up in the gray dome comes the cheerless note of a passing raven. Both seem

but to accentuate the intensity of stillness. And with the stillness stalks her gaunt, silent sister, famine. To the small furred and feathered wood folk, the deep snow with heavy frozen crust is implacable in its concealment of seeds, frozen berries and the hoarded supplies of squirrel and wood-mouse. Here, the litter of wood chips scattered over the hard



REDPOLLS AT WORK GETTING THEIR MEAL FROM THE MINUTE SEEDS IN THE DRY CONES OF THE ALDER

white surface from a dead branch overhead shows how desperately a woodpecker has worked for his breakfast of tiny wood-boring grubs. There, a scattering of scales from hard, dry alder cones gives evidence of the work of redpolls or siskins in their search for minute seeds.

The tide of life is at its lowest ebb.

Then mid-March, and with it the promise. Slowly, almost imperceptibly, during the passing days, have come subtle changes. Little strips of bare earth, appearing at first around each isolated stump or granite rock, have slowly widened and merged until the snow has been driven back to its last stand in the shelter of the forest. The streams are running clear, and on the lakes the ice is black and spongy and treacherous. Along the edge of the clearing, beds of finely-cut aspidium ferns, still pressed flat by the winter's snow, show a cheerful green, and from the side of an old yellow birch trunk a gay little company of polypodies have relaxed from their winter's shrivelled curls, and are waving small green hands to bid all be of good cheer.

While yet there is no sign from the south, life is

stirring with expectancy. On the surface of a quiet pool a band of whirligig beetles have come forth and are skating joyously about over its liquid face. Daring prophets indeed, for a few feet away they could skate on real ice. At the bottom of the pool, less bold, but hopeful still, a black-spotted leopard frog has emerged from the mud, and clings to the new

shoots of pond lilies already three or four inches long. A little shallow digging into the top of an ant-hill discloses a company of its tenants still rheumatic and stiff-legged with chill. Another fortnight will find enough of them scurrying about to gladden the hearts of the flickers then arriving from the south.

Again the raven flies over, but now, instead of the depressing croak may be heard his clear "Bob, Bob", or a truly beautiful and mellow bell note known to very few of even our Nature lovers.

In the town the street pigeons are crooning from the sun-warmed roofs, and even the English sparrows are attempting all kinds of musical gurglings, and reminding their more sober-colored mates that now is the time for house hunting.

But the greatest enthusiast of all is the chickadee. An optimist at all times, he is now fairly bursting with joy. His cheery "chick-a-dee-dee" calls are punctuated with sweet warblings, and in his anxiety to hasten the tardy calendar he throws back his head and with all the strength of his tiny body whistles loud and clear, "Sweet spring!" Who can doubt that his call helps the buds to swell and the soft gray pussy-willows to burst their hard brown coats?

March draws slowly, so slowly, toward its close. In the fence corners and wherever the snow has lain heaviest, fresh emerald grass-blades appear. A warm rain has brought hundreds of worms to the surface. Why do the robins delay their coming?

In town gardens the crocuses are showing their long-stemmed wine-glasses of white, purple, and yellow, and the snowdrops are shaking out tiny green-tipped white bells.

Along the brook the speckled alder has loosened its tasselled catkins, and, at the slightest touch, clouds of yellow pollen float away on the mellowing air.

Across the clearing drifts a dark butterfly, probably a "mourning-cloak" or a "tortoise-shell." Most of our northern butterflies spend the winter in the less vulnerable state of egg or pupa, but these hardy species and a few of their relatives emerge from the chrysalis in the autumn and, seeking some sheltered nook, sleep away the winter ready to come forth on the first mild spring day and sip nectar from willow bloom or the sap oozing from some bruised maple twig. Late last fall, beneath the white birches, I picked up a loosely-rolled cylinder of fallen bark. Idly tipping it toward the light, I looked through its interior, and there, nestling within, were five "mourning-cloaks", prepared, with only this fragile shelter, to brave the hazards of frost and snow and myriad in-

sect enemies that prey upon it

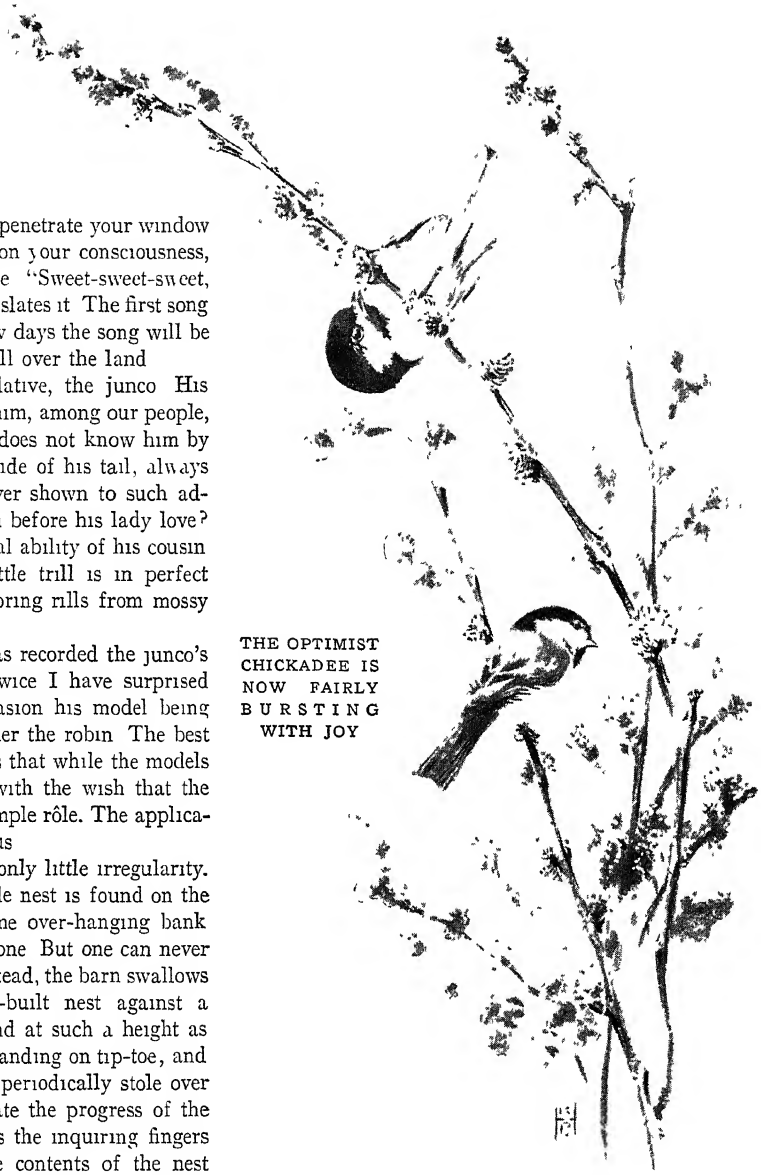
With such local preparation, surely the arrivals from the south are overdue Suddenly, one morning, the head of the procession appears You are lying in that borderland between sleep and waking, just aware of the spring sun trying to penetrate your window shade, when a song breaks in upon your consciousness, and at once you are wide awake "Sweet-sweet-sweet, very-merry-cheer", Van Dyke translates it The first song sparrow has arrived, and in a few days the song will be heard from post, bush and tree all over the land

With him comes his little relative, the junco His modest blue-gray coat has given him, among our people, the name "gray-bird" But who does not know him by the pure white feathers in each side of his tail, always apparent when in flight, but never shown to such advantage as when he spreads them before his lady love? While he may not have the musical ability of his cousin the song sparrow, his simple little trill is in perfect harmony with the trickling of spring rills from mossy ledges

I am not aware that anyone has recorded the junco's attempts at song mimicry, but twice I have surprised him in such efforts, on one occasion his model being the song sparrow, and on the other the robin The best that could be said of his efforts is that while the models were recognizable one was left with the wish that the performer had kept to his own simple rôle. The application of the moral may be obvious

Nor is plagiarism the junco's only little irregularity. Normally, his carefully-built little nest is found on the ground, in a cozy hollow of some over-hanging bank or beneath a projecting root or stone But one can never be sure, for back on the old homestead, the barn swallows every year plastered their clay-built nest against a beam beneath an old building and at such a height as to bring it within reach only by standing on tip-toe, and every summer inquisitive fingers periodically stole over the side of that nest to investigate the progress of the swallow family But one year, as the inquiring fingers appeared over the clay cup, the contents of the nest exploded in several directions,—a very thriving family of junco fledglings The swallows, reluctant to yield up the locality, but unable to eject the intruders, had built a second nest a few feet away against the side of the same beam

Standing apart in the old pasture was a little grove of spruces which evidently concealed a junco's nest One of the parents, with full mouth, would disappear into its shadow and presently appear and clean its beak with the air of a domestic duty well done A thorough search of the ground beneath the trees revealed nothing Presently, from a place of concealment within the grove, a junco was seen to appear, and after a cautious survey of the surroundings, to hop upward from limb to limb into one of the thickest spruces and presently disappear into a dark mass at the end of a branch Here, at last, was the solution of the mystery—a neat little nest of grass and horse hair nestling snugly within the coarse clay walls of a robin's nest



THE OPTIMIST
CHICKADEE IS
NOW FAIRLY
BURSTING
WITH JOY

Late March brings a tidal wave of glorious melody. Thousands of fox sparrows, en route to their northern nesting grounds, arrive in full song, remain a few days and are off. Along the edges of the woods, where last year's leaves fill the little hollows, you will find them scratching industriously but taking time to pour forth a flood of warbling music. You will recognize them by their large size, for they are the largest of all our sparrows; by their heavily-blotched breasts, and by the deep foxy-red backs which give them their name. In three weeks at most they are away to the shores of Arctic seas and you will see them no more till autumn, when in silence and haste they are retreating southward before the advancing winter.

More noisy, though far less musical, is the black horde of grackles which arrives at this time. From lawn, field and orchard come their chatterings and squeakings. Immigrants from the west, they have penetrated into our province only in recent years, but in such numbers that their creaky voices, like the sound of unoiled hinges, are familiar field notes. Our true Nova Scotia blackbird, the rusty blackbird, is smaller and more retiring, but from the alder thickets and tamaracks along the rural water-courses his sweet voice may still be heard calling "Genevieve."

Best known and best loved of all the early arrivals is the robin, and although he is not the robin red-breast of English song and story, for his breast is not truly red, our pioneer forefathers, homesick for their rural duties, took him at once into their affections. And he, in turn, has confidently adopted the friendship of man

and his cultivated areas. True thrush that he is, he sings best at evening, and, from 100 or tall elm comes that song quoted by Burroughs from an unknown translation—

"Cheerily, cheer up! Cheer up!
Cheerily, cheerily, cheer up!"

The tide has truly turned. The first arrivals will soon be followed by the later sparrows, by the swallows and swifts, by the vireos, and the many-colored warblers. Already the big black and yellow bumble-bees are droning among the dead leaves, searching out the pink faces of the first mayflowers, and as the last level rays of the advancing sun light the northward faces of our houses, there rises from swamp and meadow the evening chorus of wood frogs and peeping hylas.



HOW DID

BY CARL KREBS

SOMETIME in the life of this tree, which stands near Creston, Ohio, a catastrophe occurred. It is a soft maple, as the leaves on the forest ground testify, and as substantiated by the bit of foliage that still clung to the twigs on the 30th of October when this picture was taken.

The trunk of the tree grows some sixty feet straight up to the sky. About four feet from the ground a cluster of large roots issues forth from the bole. The bole is perfectly normal below these roots and measures



AN UNSOLVED FOREST MYSTERY
How did this maple acquire such queer roots four feet above the surrounding ground?

IT HAPPEN?

WHAT CAUSED
SUCH ROOTS?

two feet in diameter. A rough growth surrounds the juncture of the roots with the bole.

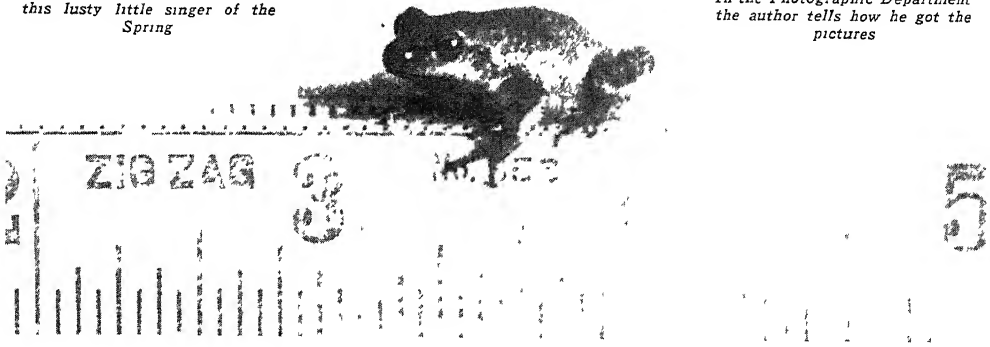
There are no creeks, rivers, or lakes nearby, so the agencies of turbulent waters could not have caused this phenomenal growth. At this place, however, the woods are somewhat on elevated ground and are composed largely of second growth timber. Perhaps winds partially uprooted this tree and it afterwards regained its hold and developed into a well formed specimen. Yet this explanation does not completely satisfy

JUST SO BIG

*Barely an inch is the measure of
this lusty little singer of the
Spring*

HOW THEY POSE

*In the Photographic Department
the author tells how he got the
pictures*



PIPES of PAN

Singers of the Swamps and Meadows in April

by Hugh Spencer

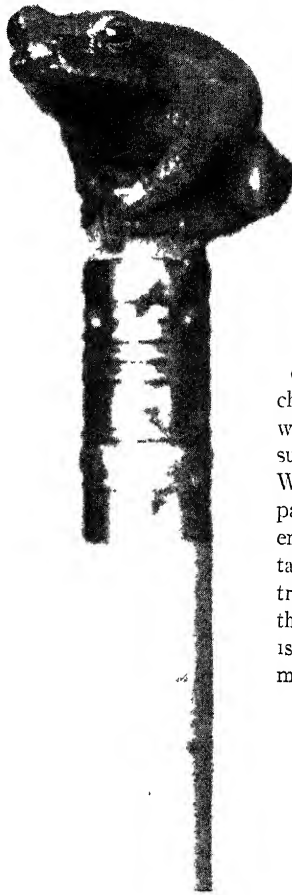
Photographs by the Author

SPRING with its sounds of new life! Spring, with its odors of growth and newness! Spring, with the awakening of dormant Nature! Eagerly is it awaited and happily is it welcomed. And its coming, signalled by many voices, brings one song that is at once typical and yet, to the majority, mysterious. It is the lilt of the spring peeper, seeming to come from the water or from the very earth itself. Yet try to find this elusive singer. Even the keen-eyed small boy usually fails. But, though nowhere to be seen, these little fellows are plentiful enough if we may judge from the volume of sound they send forth in the April twilight.

Sometimes while walking in cool shady woods in summer you may see a small creature scamper across your path with three hops and a jump. He is not much larger than a grasshopper and if your eyes are not sharp you may mistake him for one. But look closely and quickly and you may discover a small frog an

inch or less in length and about the color of a dead leaf. This is our piper of the spring meadows. He has forsaken the water to roam the forest floor or climb about in low bushes hunting for the small insects upon which he feeds. He has also left his voice behind him in the chilly spring waters, rarely do we hear him in the summer months. I use the term "he" advisedly for in frogland the males do all the talking, the females always maintain a dignified silence.

Come, take a walk with me some evening in April when the swamp orchestra is at its best. Now that we know what he looks like let us see if we can surprise him in his spring environment. We will take a flashlight and a covered pail, the latter in case we are fortunate enough to capture a few specimens to take home for closer observation. Let us trail along the edge of the marsh where the pipers are the noisiest. The sound is really terrific when you are in the midst of it and it is difficult to locate



A TINY FELLOW

The spring peeper is certainly a vest pocket edition of a froglet



the source of any of it. Then, suddenly, as they become aware of our presence there is a lull in the clamor, we hear the rustle of leaves in the undergrowth, and far overhead, the cries of some bird migrants passing on their swift northward flight. Soon there comes a shrill ye-e-e-p from a far corner of the marsh, then another and another, and in a minute they are hard at it again far and near. The sound seems to come from under our feet, over our heads, everywhere about us.

We take our stand near a small pool and play the flashlight about each clump of grass along the water's edge and are soon rewarded by the sight of one. The light does not seem to disturb him at all as he sits half in and half out of the icy water, tooting away upon his bagpipe with all his might. He may climb out of the water up some blade of grass or twig, still tooting a ballad to his mistress. We reach out a big hand and make a grab for him and all we get for our pains is a handful of wet grass and leaves. But patience has its reward and we soon go home with two of the little fellows to examine them closely and see what manner of instrument this is upon which they play their tune. Not the least disturbed by captivity they begin to sing in the pail before we get back to the house.

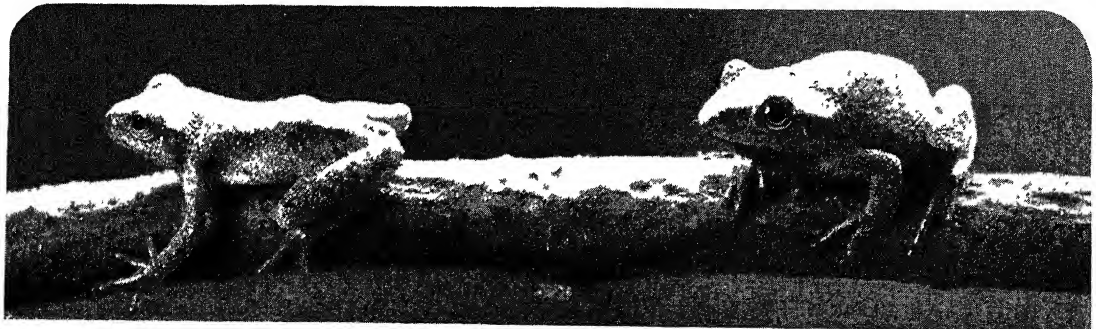
Young bullfrogs is what one native called them when we showed him our catch, and I have known many otherwise intelligent people who thought the same. But the bullfrog sometimes attains a length of eight inches, and *Hyla crucifer*, for that is our peeper's name, is the smallest of the tree frogs, scarcely an inch long! Observe his feet, which are provided with little sticky pads on the tip of each toe. By these he clings



ACROBATICS
Sticky pads on its feet help



CONTRAST—BULLFROG CAST AND PEEPER
(Below) Out on a limb but being a tree frog he doesn't mind it in the least



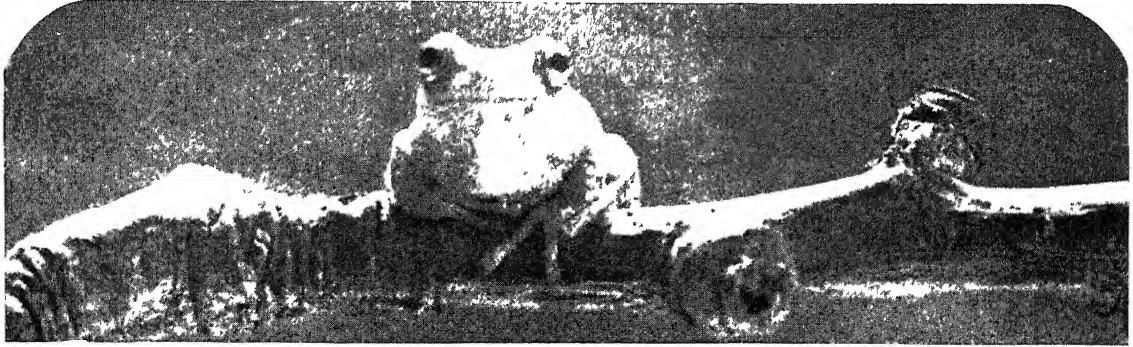
with ease to leaf or twig of small size.

We transfer our specimens to a glass globe provided with a bunch of damp moss at the bottom and a miniature ladder for the acrobats. There must also be a cover for the top. Now, if our hylas do not vanish underneath the moss they may crawl up the side of the globe and begin to squawk. One would suppose that in order to make so much noise the peeper would have to open his mouth, but such is not the case. Instead, he expands the membranes of his throat until it resembles a bubble half as large as his body and in some way by the expanding and contracting of this balloon he makes his music. His voice seems capable of a variety of tones, and sometimes he trills.

The little fellows appear quite contented in captivity, and though shy and wild at first they soon learn to be handled without fear and make most interesting pets.

Hyla's food consists of small insects, and his manners when eating would be a shock to Mrs. Grundy, for he will leap across the table in any direction and catch his dinner in a wide open mouth. It is swallowed in a jiffy. If he happens to capture something not to his taste he will eject it with an expression

of disgust and look about for something more appetizing. One can always get a thrill by introducing an active fly into Hyla's house and watching the sport that ensues. Mr. Frog may miss his quarry several times and bump his nose with terrific force against the walls or top of his house, but apparently without discomfort or ill effect. Sooner or later he will get his fly and will then sit quietly and rest with almost a smile of satisfaction on his face.



SEE WHETHER YOU CAN FIND ME THIS SPRING
So elusive as to seem to many mysterious, the peeper is, nevertheless, a most audible little fellow

A word of caution to anyone who contemplates keeping frogs in captivity. All frogs are moisture-loving creatures and cannot live long without it. Keep a bit of damp moss in your frog jar, feed them a fly or two a day and they will thrive. In winter, when live insects are not available, they can be taught to eat meal worms

or ant eggs, which may be procured from bird stores, or even bits of raw meat.

But the real place for these little fellows is in their swamp or meadow telling us in their own peculiar way that spring is here and that all is well. There we may observe their home life, and how the tiny tadpoles develop



LEAVES *that* WALK

An Insect Ruse Which Works

by John J. Bichell

WALKING LEAVES ABOUT TO FOOL SOME ONE
Note that the female on the left carries her deception even to the point of having broken edges like old leaves. At the right, a pair show off on slender twigs.

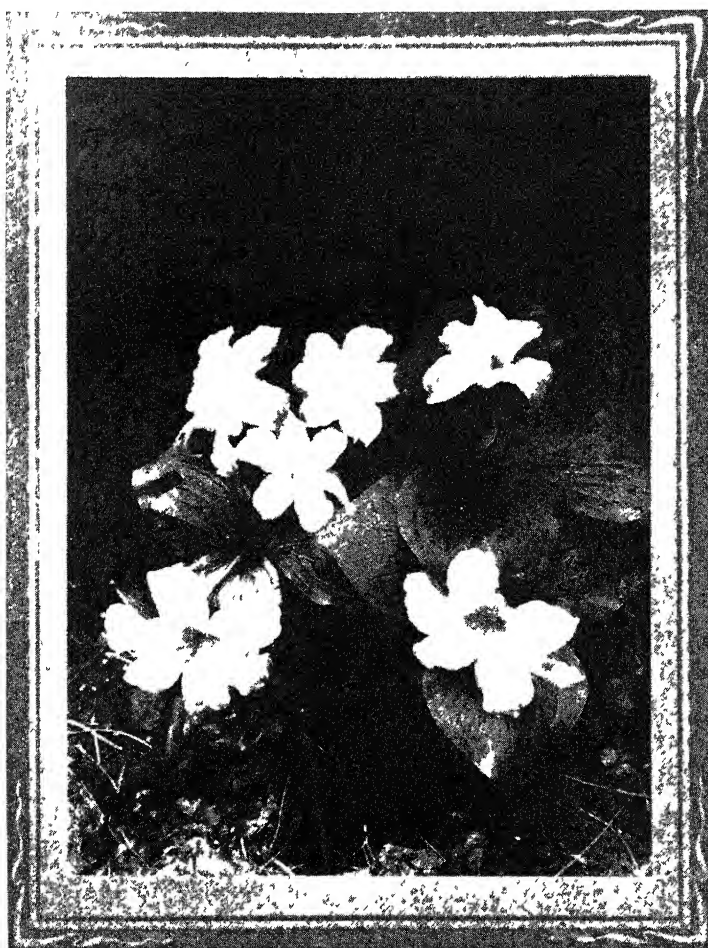


THE WALKING LEAF, an insect species the female in which has disguised herself to resemble vegetative life probably more cleverly than any other, comes originally from the island of Ceylon, but has been raised in Europe, whence eggs have been imported to America. When the young emerge from the eggs they are very active and a bright red in color. They do much walking about, but do not begin to eat until they are about one week old. A week later, they have begun to turn brown, and by the time a fortnight has passed, the females are green, which color they maintain until they perish. The older and larger they get,—and they grow to be four inches long—the more do they resemble a leaf. In their native country they feed on tea leaves and leaves of certain species of lemon trees, although I got good results in the United States with willow tree leaves and oak leaves. They are entirely vegetarian.

When about to lay their eggs, they snap their body with such force that the human eye cannot see the eggs shoot through the air to land in a spot where they remain from four to seven months before hatching. The insects molt six times, each time expanding so enormously that one wonders how they could have ever fitted the skins

they shed. As they are but five-eighths inches when hatched, it is apparent that they grow considerably during their lifetime.

The males are more slender and smaller than the females, measure from 60 to 70 millimeters in length, and do not retain the leaflike appearance. They also have antennae almost as long as their entire body, and are able to fly several yards at a time. Some males are yellow and green, others green with a blue tint. They live only four or five weeks after maturity. The females are much larger, have short antennae and cannot fly. Their movements are sluggish, although they are very graceful when they soar down by use of their leaf-like bodies to where they want to go. Females are all of uniform green, and expel from eighty-five to one hundred eggs, and live from eight to nine weeks after maturity. They are about 100 millimeters in length, when fully grown, and it takes a sharp eye to discover their ruse for self-protection.



JOHN R. CONNOR

BLOOMS OF THE RARE DOUBLE TRILLIUM
*An exquisite beauty of the hardwood forests that is worth
 the search of the Nature lover*

DOUBLE TRILLIUMS

by Jean Maitland

SHE was rambling through an Ontario hardwood forest, this lady who loves the wild flowers, when she spied a little, brown, shrivelled trillium bloom. She kneeled and found that, instead of the usual three petals, its outer row boasted six. Her trowel sunk into the ground, bringing forth the plant and around its roots enough leafy loam to make sure that the trip to her wild flower garden would be safe. In that garden, next spring, the trillium bloomed with twenty-four petals, four rows graduated in size with six petals to a row. Tender care and cultivation aided the plant until it achieved eleven blooms, the largest of forty-two petals.

This was the rare and exquisite double trillium that may be found, now and then, blooming in May or early June in the hardwood forest. It grows side by side with the normal specimens of the wake-robin, and it also resents being plucked. So short is its flower stem that picking means taking also the leaves the plant requires to manufacture food, thus a weakened and

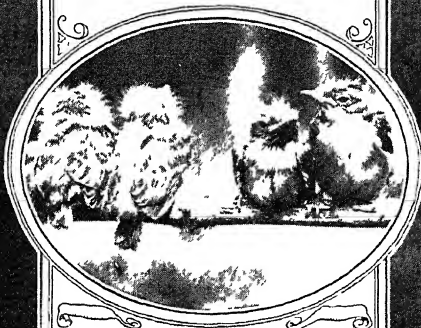
probably dying root is all that is left. And the reward is nothing but a quickly-wilting flower.

Friends of the lady who successfully brought a double trillium into her wild garden sought diligently for a similar prize, and found two more. One of them sent a bloom to Luther Burbank, who pointed out in an enthusiastic reply that this variation is one of the many freaks of the family. It lacks stigma, style and ovary. Stamens, also, are missing, and no seed is formed. The energy usually used to produce seed goes into the development of an abnormal number of petals. Mr. Burbank pointed out that the only means of propagating the plant lies in carefully separating the small bulbs while the trillium is dormant.

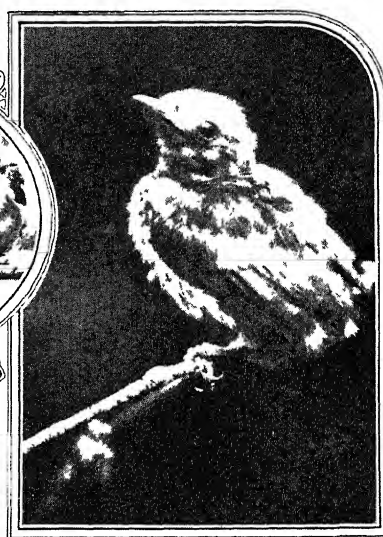
So the double trillium is one of those lures which will send Nature lovers abroad in search of the rare and elusive. The true Nature lover will leave the lovely plant where it is found, or will deftly and carefully transplant it to a wild flower garden and care for it.



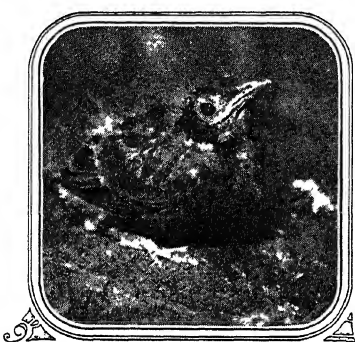
*Young Magnolia Warbler
thinking about flight*



*Four youthful mem-
bers of the Yellow-
bellied Flycatcher
family*



*This baby Redstart is
getting "air-minded"*



*Junior Robin looks
rather disdainfully
at the world*

*When it's
NESTING TIME
in
New England*

*A page of
BIRD
JUVENILES*

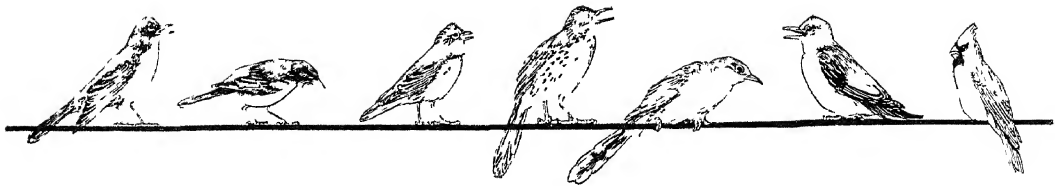


*Olive-backed Thrush
baby out of the nest
for a pose*



*Hungry Phoebe
babies, with Chick-
adee at left and
Junco at right*





SOME NOTABLES of the Tree Choir

What Is It that Makes the Music of Birds?

by Henry Oldys

TO DISTINGUISH the birds by their songs requires, not a musical, but merely an attentive, ear. One who has never hummed or whistled a tune can differentiate the various species of birds by their singing as well as he can a Plymouth Rock from a bantam by its crowing. The barnyard fowls are identified, not by the notes they utter, but by the character of voice and style of crowing. So with song-birds. Owing to the great individual diversity of songs one who neglects the quality, or *timbre*, of the voice and mode of rendering the song and depends solely on musical notations will be able to distinguish few birds. The fact that the songs of many birds are musical, and that such utterances as the barking of dogs and lowing of cows are unmusical, has no bearing on the matter. Noise and music are both sounds, and one sound is as easy to learn to recognize as another. Hence any unmusical person with a discriminating ear and an interest in the subject may hope to be able to make as quick and as correct identifications of birds from their songs as may a violin virtuoso.

Every species has distinctive vocal characteristics. One song sparrow may have as many as twenty different songs at his command, each as much his own exclusive property as though copyrighted. But all of these, as well as the songs of all other song sparrows, have certain qualities that proclaim that the singers belong to that species and no other. I have heard a song sparrow sing a song that was in form the exact counterpart of a chewink's. Yet there was no mistaking the fact that the bird was a song sparrow singing a chewink song. The

only exception to this rule is the mockingbird, which renders the song of another bird in that bird's own voice. But the mockingbird changes rapidly from one imitation to another, and by the time several diverse songs and cries—perhaps cardinal, blue jay, guinea hen, whip-poor-will, and killdeer—have issued from the same spot it is not difficult to decide that they have also issued from the same throat.

With this thought in mind, that each bird's singing is marked by a certain method and a particular quality of voice that indicate its species, and that these characteristics are as open to a non-musical person as to a musician, let us note the singing of a few of the more prominent members of the vernal choir and try to determine what these distinctive features are in each case.

Why is it that when we hear a robin song we recognize it as a robin's? (I am speaking now of ordinary songs, not those unusual ones that occasionally arise to perplex even an expert.) I should say that the main distinguishing mark of the singing of a robin is its *eager insistence*. The bird will perch in the top of a tree in the open in full sight, often in full sunlight, and will pass from phrase to phrase so rapidly that each seems to tread on the heels of its immediate predecessor, while each is itself so quickly uttered as to be almost a jumble of notes. There may be only two or three phrases to the complete song, or there may be eight or ten, but there is always the same suggestion of impetuous speed. The different phrases are very short, loud, varied, clear-toned, and rippling, sounding as though whistled with



REMSEN BRINCKEROFF

BROWN THRASHER AND THE RUSSET-BACKED THRUSH

The thrasher is one of the first birds to withdraw his voice from the bird chorus. The russet-backed thrush is a western songster with a song that starts with a musical whistle in a low key, ascending until it ends in a spiral thread.



WILLIAM L. FINLEY



FRANK BOND



RED-HEADED WOODPECKER AND THE ROBIN

His song compared to that of other birds, is as a nebulous cloud to a constellation. The distinguishing mark of the robin's song is its eager insistence and its jumble of notes



FRANK BOND

play of the soft palate between notes. Meantime, in contrast to the hurried style of his utterance, the singer remains quietly posed in one spot as he repeats his song from time to time. As a rule these repetitions are varied. The different brief phrases which compose each song are apparently picked up and thrown together at random, after the fashion of a voluble talker with a disorderly mind. Here again there is a hit-or-miss eagerness about the performance that suggests breathless haste.

The Baltimore oriole sings briskly also, but as he dashes off his song, which is all in one phrase—generally a perfect little melody or tune—he seems vigorous only, not heedless. The robin seems to fear that if he does not hurry the world may lose something of value, the oriole utters his song in an off-hand way that seems to indicate indifference to his audience. He is much less formal, too, in his manner of delivery, often moving from point to point and perhaps snatching mouthfuls of food in the rather long intervals between songs. There is an incongruity between this bluff independence and the distinctly plaintive quality of his voice. His tones are round, full, mellow, smooth, and almost as loud as a robin's, but there is a querulous touch to them. It is this half-sad tone quality, coupled with energetic briskness of delivery, that more than anything else distinguishes the oriole's singing from that of other birds. Another distinguishing feature, which, however, is not always present, is a habit the bird has of prefacing his song with several widely-detached single notes, in which all the tone qualities just referred to are observable. The song, which is rather long, as bird songs go, is repeated over and over without change, a proceeding which is not so common as is popularly supposed.

The wood thrush is

one of the great avian singers of the world. Not only does each wood thrush utter tuneful phrases, but its various melodies are so related to each other as to form a musical sequence, sometimes very rhythmical in character. They exhibit a relationship to each other similar to that in the lines of a song. In this respect the wood thrush outclasses all European birds that I have heard, excepting possibly the blackbird—which is a thrush—and the rock thrush. It is rivaled by several American birds. Naturally it is a matter of much interest to be acquainted with the song of a bird of such high rank. This is easy to attain, because the song is unmistakable. It is as quiet and leisurely as the robin's is strenuous and headlong. It is composed of short deliberate phrases of three or four notes each, separated by even-spaced, meditative pauses and delivered in clear, penetrating, tones that have the rich *tang* of a large silver bell, and with the palatal play previously referred to in constant use between notes. Each phrase is preceded by two or three quick light notes on a lower pitch—heard only when close to the singer—and followed by one to three rapid high metallic notes that resemble the swishing of a whip or the *tinging* sound given by a telegraph wire when hit by a small stone. These fore- and- after notes may be omitted on occasion, improving the song. Also

the high after notes may be replaced by a deep heavy tone of very rich quality. Add to these points that the wood thrush, instead of launching his song into space like the robin, sounds his silver clarion in the heart of the woods, usually from a low perch, where he will remain for an hour or more at a time, and surely one should know this paragon of songsters on first hearing.

The brown thrasher is one of the first birds to withdraw his voice from the general chorus. His musical season ends before the first of



LYNWOOD M. CHACE

MOTHER WOODTHRUSH ON THE NEST
Perhaps the most popular of all the bird choir when it sings at evening

July. But he makes amends for his early absence by his assiduity while present. He is a model of earnestness and emphasis. Whatever he does he does with all his might. Should he undertake to break up some hard bit of food, he hammers it with all the energy of a woodpecker, when resenting intrusion upon his privacy, he hisses, utters loud smacks, or gives vent to a round, full, suddenly-muted whistle which makes a very rapid turn down and up again—a whistle that country school-boys are fond of imitating. When courting he prepares a clean-swept little parlor beneath a bush, entices therein a love-lorn female, and seeks to stun her into acceptance by lively gyrations and marvelous leaps, in which, cupping his wings, he comes down on the bare earth with a hollow sound that can be heard many yards away. When on his favorite song-perch, the very tip of a tall tree, he delivers his notes with a continuity and vigor that even a mockingbird can hardly equal. When he is singing he makes that the sole business before him and utters phrase after phrase with scarce pause enough between for breath and with the full power of his lungs, keeping up this stress and strain by the half-hour. He is sometimes mistaken for a mockingbird. Indeed, one of his names is "sandy mockingbird," but he is not the artist the true mockingbird is. His voice is much more limited in range and variety of tones, and when on rare occasions he imitates those short songs of other birds that form the entire substance of a mockingbird's song, he does so with little precision and without changing his heavy, throaty voice. The mockingbird's imitations are exact reproductions in every respect. Each of the brown thrasher's many phrases is short, quickly uttered, and may be repeated rapidly two or three times before it is dropped for another, thus—"Benedict, benedict, benedict," "Good-yeara, good-yeara," "Tē-bor, tē-bor" (evenly stressed), "Come here, come here, come here" (rapidly).

Although the brown thrasher does not aspire to showy colors, his rich light-brown coat, long bill and tail, and assured manner lend him an air of distinction. These various characteristics, together with his habit of seldom rising more than a few feet above the ground, except when gratifying his mood for music single him out.

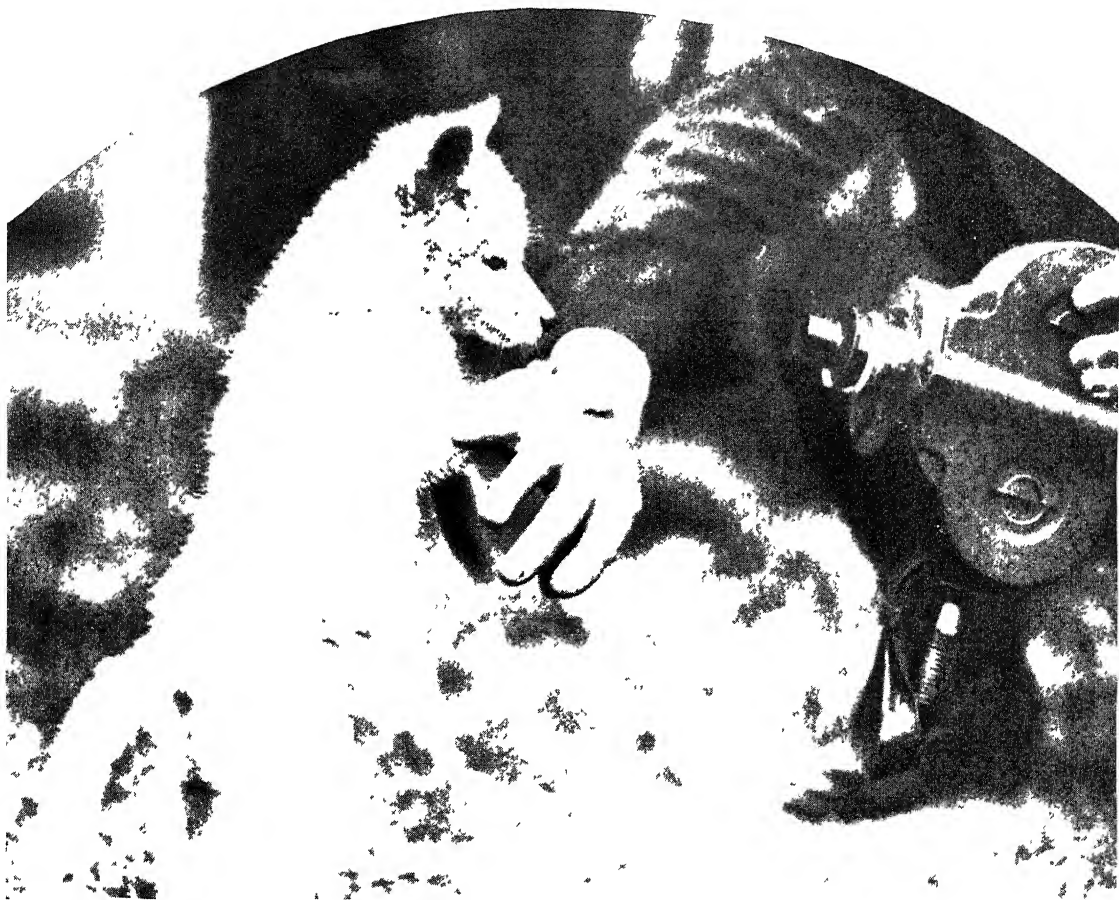
The peculiar vociferations of the yellow-billed cuckoo have forced themselves upon the attention of our farmers, who hear in them prophecies of rain and have dubbed the bird the "rain-crow." The cuckoo sings every day throughout the summer, and since it sometimes rains in summer, I suppose he may be considered a true prophet, upon the principle of the "About-this-time-expect-much-rain", as says the old-fashioned "almanack." No less far from the truth, however, is the idea of those who imagine that the cuckoo clock can be depended on as an aid in identifying the American cuckoo. That time-piece reproduces exactly, though in miniature, the notes of the European cuckoo, but our two species of cuckoos sing in very different style. There is no semblance of music in the expressions of the yellow-billed cuckoo. One of these utterances is a series of evenly-spaced gulping notes, such as a human being would make vocally with the soft palate, somewhat like though harsher than the "glug-glug-glug" of water as it comes interruptedly from an inverted bottle. Another

may be reproduced after a fashion by striking the round backs of two half coconut-shells together fifteen to twenty times, rapidly at first, then slower and slower to a very halting close. These are his usual "songs." Both are loud and come from behind the middle foliage of a tree where the author of the cacophony is concealed.

The red-headed woodpecker has as full an appreciation of the value of publicity as a politician. Wherever he may be he is in evidence. As he claps his gaudy colors to telegraph pole, dead tree, or fence-post, as he hammers loudly on the resounding wood, as he flies conspicuously across the open spaces, as he conveys his frequent and sonorous message to the public, he thrusts himself upon the attention like headlines, a bursting tire, or a circus poster. His song—if it may be called such—is a rapid, whirling, all-pervading repetition of a large, rolling, guttural note which seems to spread a thick, whirling canopy of diffuse sound overhead. In comparison with the song of another bird it is as a nebulous cloud to a constellation. It may be likened to a very throaty *k-r-r-r* repeated evenly, rapidly, and with heavy volume a dozen times.

The cardinal is red enough to please the most radical member of the Third Internationale, but he is a mild-mannered gentleman. A cardinal that comes regularly to my bird table, unlike song sparrow, brown thrasher, catbird, and junco, behaves like a Chesterfield. He is courteous and gentle toward the other frequenters of the table and often stops his own eating to place a morsel in the mouth of the mate or full-grown youngster that sometimes accompany him. He feeds without any of the greediness of such birds as English sparrows, starlings, and grackles. Moreover, he exhibits a dignified disregard of danger that few birds manifest. The cardinal's strong character appears in his song, which rings out from the tree-tops like a clarion call. It is a loud, clear, very full, liquid whistle of a robust soprano quality. Each of his varied songs is long and is made up of rapid and regular repetitions of a two or three-note phrase. These are unbroken repetitions, excepting that not infrequently a cardinal will first give the phrase a little more slowly and follow it with a brief pause, as though setting himself a copy or announcing his theme to the audience. Most of his phrases are rippling, with palatelay to a notable degree, but two conspicuous exceptions consist of long smooth notes which slide, the one up, the other down, a full octave. The first of these begins with a round whistle that gradually gets thinner as it gets higher, changing from an *oo* to an *ee* sound and cut off at the top with an abrupt *t*. The second, reversing this process, begins with an explosive *tee* and changes in the slurring descent of the scale to an *oo*, which fades out on the note from which the first phrase began its ascent. Frequently this vocal journey up and down the scale is made in one trip, by joining the two phrases together at the top. One of the many rippled phrases suggests very strongly the words "pretty girl," a compliment to his mate, actual or prospective, which the singer emphasizes by reiterating it ten or twelve times without a pause.

So, whether you are musical or not, turn an attentive ear to the bird songs which the springtime brings us. Learn them and find the joy that there is in associating the singer with his song.

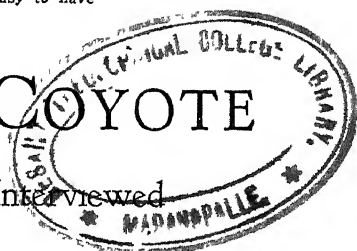


SKEEZIX WAS INTRIGUED BY THE CAMERA
He was a good subject for the movie film but less easy to have
pose for the still camera

SKEEZIX, a WHITE COYOTE

A Rare Member of His Tribe is Interviewed

by
William L. and Irene
Finley



Illustrated from
Photographs Taken
by the Authors

HE was white That was what saved his life
It all came to pass this way Where the homesteaders come with their flocks and herds to the lands of eastern Oregon, there are coyotes These wild dogs of the sand and sage find easy food among these domesticated beasts So war has been declared and there is a bounty on their wily heads One of them had been dispatched by a federal hunter and his den discovered



In it were four pups, cuddled in the enlarged badger burrow Fate decreed that three should not grow to roam the rim rocks, but the fourth Well, he was white Not a true albino, to be sure, for his eyes were gray, not pink, but his coat contained none of the coloring matter that made him one with the land in which his fellows roved

It was rather a small family that the hunter unearthed, for the coyote is a prolific breeder

A female may have from one to fourteen pups, one case of the latter is on record in Portland, and several of thirteen. The average litter is six or seven. Larger than a fox, smaller than a gray wolf, the coyote is a distant relative of both, but his wits are perhaps sharper than his cousins' because he is born and bred in a wide open country where only the keenest can survive.

This snowy habit of the coyote pup brought fame to his nimble feet. Out of forty thousand of his tribe killed in Oregon during the past few years none boasted such a coat, said Stanley Jewett of the Biological Survey. He ventured, further, that Skeezix—for such became his name—was probably one in two hundred thousand, which, after all, is no small distinction.

Arriving at the Survey office in Portland, Skeezix made friends of those hired to take his scalp. He was interviewed by reporters. His pictures appeared in daily papers, and he rollicked about the office and rattled papers on the desk while camera men filmed him for moving picture audiences through the country. At odd moments he crept tremblingly to the edge of the low windows in the Post-office Building and looked down five stories where trucks rumbled and the

wheels of loaded street cars crunched on steel rails. Proposals came from far and wide to adopt the orphan pup, other suggestions came to stuff his white hide with cotton and to set him up in some museum where moths might keep him company.

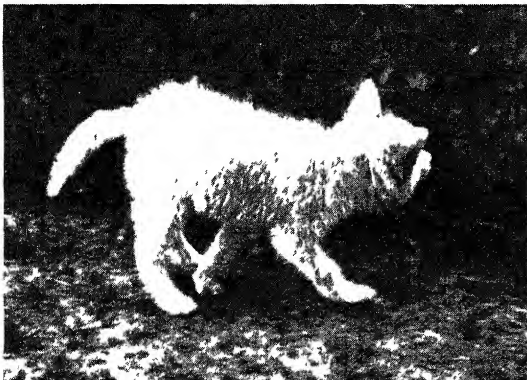
Skeezix was concerned more in getting away from strange noises, so he came to live in the country on our ten acres, and from the first he was treated like other pets—he was given the freedom of the place. Every object, however, was strange and had to be viewed with caution. He quickly recognized and came to those who fed him, yet fear, so deeply bred in his bones, showed at every turn. Being high-strung, a sudden noise or an unfamiliar object was likely to throw him into a panic. Try to approach him quickly and he would slink away when we stood and waited he would approach cautiously and then assume a friendly attitude.

His reception by Peter, our little dog, made him feel more at home. Coming as a stranger, he ran fawningly up to Peter and made his first mistake. He nuzzled in Peter's side as if he had found his lost mother. In his younger days Peter would have taken such attention as a joke, and would have rollicked and rolled with the newcomer.



SKEEZIX SURVEYS THE GENERAL SITUATION

When not otherwise engaged he stalks an imaginary enemy or occupies himself in a long and quiet watch at a mole hole waiting the occupant to emerge to its fate.



on the lawn not so at the age of thirteen years. Playful days have passed, his legs are rather stiffened with age. Peter's teeth have been smoothed on many bones, but Skeezix's were sharp and needle-like and when he took hold of Peter's leg, in one of his excited moments, friendship ceased. "Go your own way and play your own games", said Peter with a growl. But not even Peter expected an orphaned puppy to remember such advice unless often repeated.

The backyard came to be Skeezix's playground. If he wandered from the door it was with extreme caution and he quickly returned. Every one of his five senses was keener than that of an ordinary pup. A piece of meat or a bone hidden was by no means lost, he knew where to find it again. His eye caught the movement of every swallow or robin that flew across the lawn, it followed every bat in the twilight. Every visitor that had a flapping trouser leg was welcomed. Skeezix learned quickly to follow and hang on to legs with a tenacious spirit. Skirts, too, would have been welcome if lower. How he loved to worry a rope or a gunnysack! Little he was concerned as long as he had plenty to eat, could doze in the sun, or occasionally sneak up behind Peter and pull his tail.

In the brief period of a month, Skeezix's fame had spread to the far corners of the country. Even national authorities were interested, especially since he had been a ward of the federal government. Because of his unusual color, orders came from the National Zoological

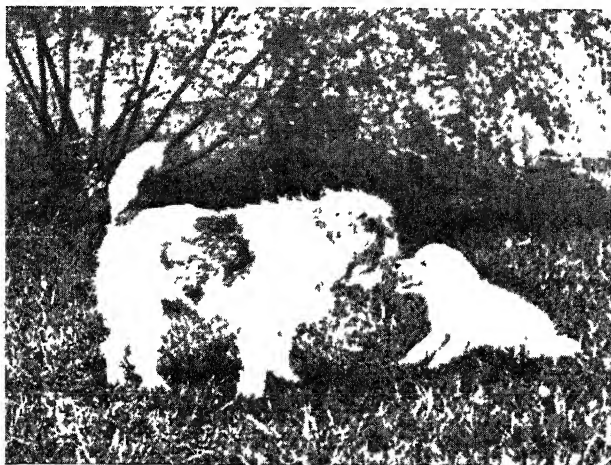
Park, and at the Government's expense Skeezix rode across the continent as the guest of Uncle Sam. Perhaps he does not know what it is all about. He has been given aristocratic quarters among the notables in the National Zoo. Here he may be viewed by senators, diplomats and even the President. He will always have plenty of bones

to gnaw, but no place to ripen them in the earth and few trouser legs to play with.

If Skeezix had survived in the desert, the possibilities were open for him to transmit his flaxen hue through his own race. Three thousand miles have separated him from this chance. He will never know the excitement of stalking long-eared rabbits, or of singing his coyote song to the moon from the brink of some wild rim-rock; nor will he develop the keen wolf wit to escape the

warfare of long-ranged rifles, steel traps and strychnine. Perhaps it were happier for him to be dogged by state and federal hunters, and bay the moon, than to fret in the fenced confines of a zoo, puzzling about the mystery of his white coat. Who knows but he would rather take chances on a slow death under the desert sun, with foot gripped in steel, than to be penned where food is plentiful and his joints grow stiff with age. He may win himself a mate and sing the long drawn-out song of his race, but not on the far away high plateaus of eastern Oregon.

Instead of the rolling plains of purple sage he must view the flowing crowds of sauntering visitors of a sultry Sunday afternoon, and listen to their endless chatter.

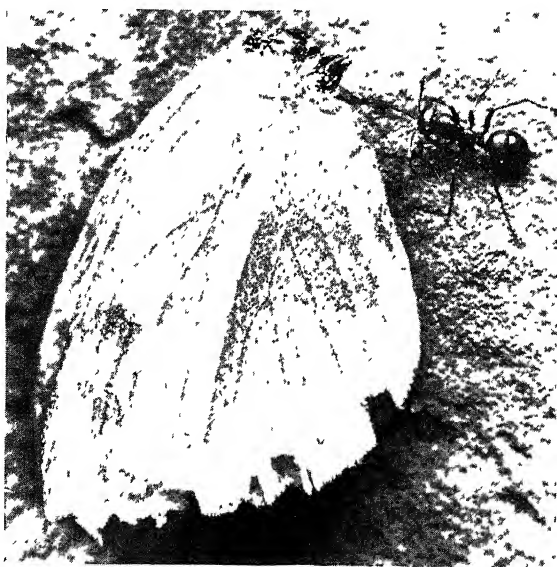


PETER MEETS THE NEW ARRIVAL
He found the white youngster a bit too rough in his play, however

INSECT

STRENGTH

WHEN man surveys his donkey engines, his steam shovels, his dry docks, and his gigantic levers, he usually concludes that he is a powerful creature, but actually, his strength, supplemented by mechanical device, is not so much greater than that of many insects, and without his



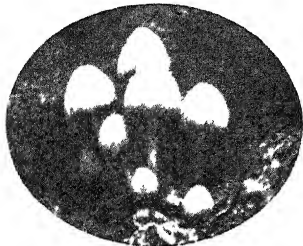
In Comparison

Man is Puny

implements, he is but a puny weakling compared to them. In this photograph, Miss Cornelia Clarke shows a little black ant carrying home a cabbage butterfly, and getting along very well. Yet what man, single handed, could drag about his tin garage, or pull an elephant along the ground?

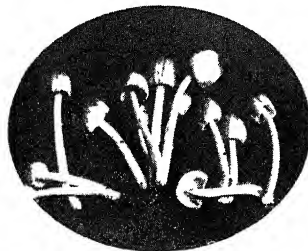
GLISTENING INK CAP

In May or June, these tender, tasty fellows crowd the shady lawns, or gather in the woods



POSED FOR STUDY

You must pick glistening ink caps the first day, else they will melt and pass away



INK

from White Mushrooms

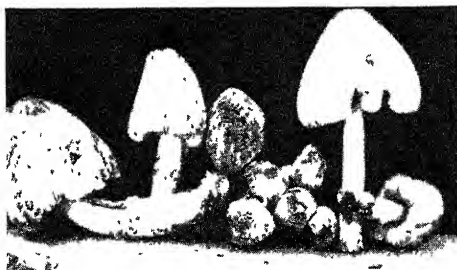
They Furnish Food and Fluid

by G. G. Nearing

AMONG the edible fungi, the ink caps securely hold third place in popular favor, with only the meadow mushroom and the puffball gaining precedence over them. And this despite their two unsavory habits,—the one of growing frequently on manure heaps, and the other of melting into an inky liquid almost before maturity. But once you have tasted a dish of ink caps, among the most digestible of mushrooms, you will understand their deserved place. For after only a few minutes' cooking, they acquire a most delightful flavor, and you can easily forget their queer traits.

Before going on search of these favorites, protect yourself and others by studying the group in a good handbook. With just a little application, you can learn their characteristics, and distinguish them from dangerous members who like them have the typical toadstool form.

Three common forms will provide you with bushels of ready food in May and June. The common ink cap, *Coprinus atramentarius*, grows grouped in barnyards, pastures, and in thin woods during rainy weather in late spring. You may also find it on your lawn. Specimens range from three or four inches to a foot in height. Similar is the shaggy-mane mushroom, but this carries on the cap fluffy threads which give it a conspicuously ragged and unkempt appearance, and it turns to ink the afternoon it first emerges unless the weather suddenly becomes dry.



THEY FURNISH INK

But who would use the common variety thus when they flavor steaks and stews so well?

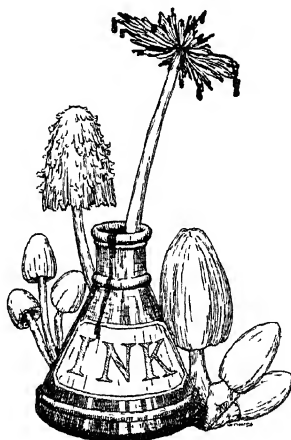
Both of these kinds are whitish, changing later to a purplish-gray and black.

One mushroom enthusiast has actually made ink out of the black liquid which they exude shortly after maturity. The color is due to spores, microscopic seed particles which have a characteristic shade in each species of fungi. Some are white, others pink, ochre, brown, purple, and in

one species green. Ink caps, however, all cling to black.

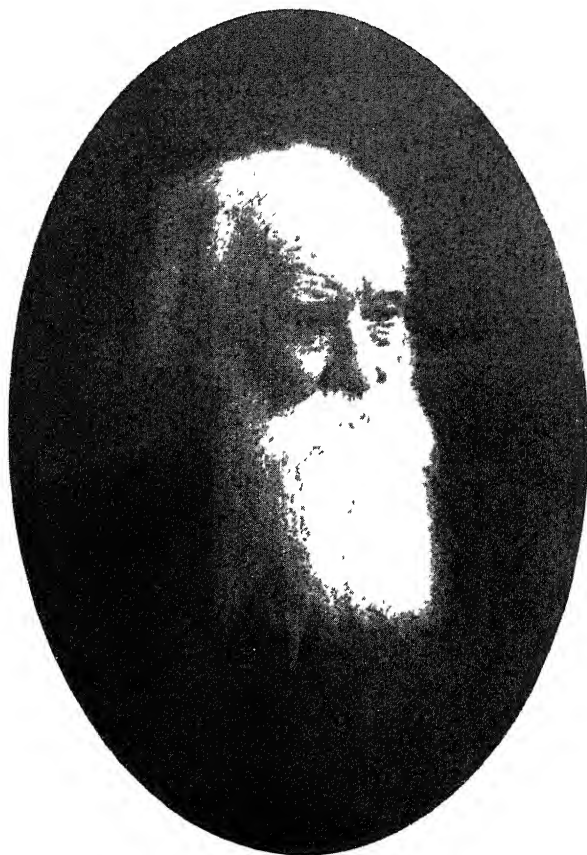
Most fungi shed their spores dry, to be blown about by the wind. Ink caps evidently prefer water transportation. Rill-faring folk!

A smaller and differently colored species is the glistening ink cap, *Coprinus mucaceus*, which tends to buff or pale yellow, with tiny granules on the cap. It grows not on manure but on dead wood or dead roots just under the ground. You will find this little adventurer anywhere in woods or around shade trees on the lawn. It often springs up between paving stones or beside fences. Sometimes in May you will see vast numbers, and a great many appear in summer. Although it takes fifty or a hundred to fill a quart measure, they shoulder each other so thickly that one patch yields good quantity. You had better pick this one the day it appears, for although it lasts longer than the others without melting, still it becomes fluid rapidly. And how tasty and tender it is, when smothering a fragrant steak! So, armed with a good guide to the mushrooms, away to the lairs of these fascinating fungi to hunt them out.



MICHIGAN, WISCONSIN AND MINNESOTA NUMBER

The May issue will be the fourth geographical number of Nature Magazine and will be devoted to what may be described as the Upper Lake States. This issue will follow the general form of the previous special issues with specially-prepared articles on the wild life, outdoors and other Nature attractions of this section, written by those specially qualified in their respective fields.



John Burroughs

A PICTURE OF JOHN BURROUGHS WITH HIS OWN SIGNATURE
(*Loaned by the Author*)

My Friend—John Burroughs

by Henry Litchfield West

Facsimiles of Letters Printed by Permission of Dr Clara Barrus, Literary Executor of Mr Burroughs

SOMEWHERE in what Hudson calls the far away and long ago, one of my ancestors must have been a gypsy or a wanderer. In no way else can I account for the fact that there was born in me a love of Nature and all outdoors. One of the greatest pleasures of my boyhood days was tramping through the woods. Once I travelled for many miles merely to find the head of a stream called Oxon Run. Many a time I have walked the fifteen or sixteen miles from Washington to the picturesque Great Falls of the Potomac, with a knapsack on my back, for the sheer pleasure of feeling the grit of the gravel beneath my feet, of brewing coffee and cooking supper upon a fire made with my own hands, and of sleeping under the stars. If I could find a congenial

companion we went together. Otherwise I communed with Nature in an enjoyable solitude.

Into this boyhood life came John Burroughs—first through his books and then in a personal acquaintance which lasted until his death. When his first volumes came out, I purchased them out of my slender earnings and then, with youthful enthusiasm, I wrote to him to tell him of my outdoor experiences and how much his books meant to me. I still treasure his reply, written on a postal card with purple ink. It stimulated me to a greater love of the woods. "Keep up your outdoor life," he said, "for it will develop the iron in your blood." The fact that I followed his advice perhaps accounts for the fact that I am hale and hearty today when most men of

my age are on the shelf and ready for rest-cures

It so happens that in the two admirable volumes in which Dr. Clara Barrus has compiled the life and letters of John Burroughs, my name is mentioned with three others who were Burroughs' constant companions in his walks around Washington. He was a man then and I was but a youngster. There was between us, however, a common love of Nature and a mutual and sympathetic understanding, even though I was a neophyte at Nature's shrine while he had been fully ordained. I marvelled always at the vast extent of his woodlore. He knew every bird by note, every flower by name. He needed no introduction to them. And I recall that upon one of these excursions we came out upon a hillside and looked down upon Rock Creek below us. The stream was muddy from recent rains.

"The creek has not washed its face this morning," remarked Burroughs, with a quaint humor that was delightful.

Our talk was not always of birds and flowers. We both loved Emerson and Thoreau and Ruskin, we both detested Browning, and we disagreed as to Walt Whitman, for never could I reach the height of exaggerated admiration with which Burroughs regarded the good gray poet. Mr. Burroughs would try to convert me by reciting some rugged and sonorous lines, but with the courage of youth I would reply that these quotations were like the Kimberley diamonds, precious when found but buried in a mass of otherwise worthless blue clay. Then Burroughs would smile and intimate that I lacked understanding. Perhaps if I had known Whitman as Burroughs did, my point of view would have been different.

It is an old story, perhaps, that Burroughs wrote his first book while an employe of the Treasury Department in Washington and that he filled page after page with glorious pictures of life out-of-doors while spending his days in a dark corridor as a guardian of a steel-doored vault. In those days the national capital was a straggling village, and Burroughs could drive a frisky cow down Pennsylvania Avenue without exciting a ripple of excitement. There were, however, some compensations. "From the hearth to the field," says Thoreau,

"is a great distance." That was not the case when Burroughs and I went out into the woods together. It was but a step from built-up streets to woodland paths. Long ago our familiar and beloved tramping-places disappeared. Woods and valleys have been transformed—aye, have been devastated—by real estate developments. The nymph-haunted spots where grew the violets and the arbutus have gone forever.

*to me. I have a touch
of homesickness every spring
for the old place. I congratulate
you on your taste
for the woods & the wild;
it will keep good the
supply of iron in your blood.
Sincerely Yours
John Burroughs.*

"I have a touch of homesickness every spring for the old place. I congratulate you on your taste for the woods and the wild, it will keep good the supply of iron in your blood."

So wrote John Burroughs to his friend,—Henry Litchfield West,—who gives us here a charming story of the apostle of Nature. Mr. West, a newspaper man and a former Commissioner of the District of Columbia, has been the intimate of many men in public life, and is known and loved by many in turn. Yet it is John Burroughs whose memory he has most deeply cherished.

Serene I fold my hands
and wait,
Nor care for wind nor
tide nor sea,
No more I rave 'gainst
time and fate,
For lo! my own shall
come to me.

Nothing in all of Burroughs' writings is so characteristic of his temperament as these four lines which begin his poem, "Waiting"—a poem which he published with some misgiving because some friends to whom it was shown failed to be instantly impressed with its beauty.

I have never known a man who was so completely clothed with serenity as John Burroughs. He accepted the universe as he found it. Pomp and power failed to impress him and he gave to a President of the United States no more consideration than he accorded to the man who trimmed his grapevines. It is true that he admired Theodore

Roosevelt, perhaps because the latter's tremendous energy was in diametric contrast to his own placidity. It will be remembered that Roosevelt invited Burroughs to accompany him on a trip to Yellowstone Park. Burroughs, who was always a reluctant traveller, accepted because he felt that the invitation was equivalent to a command. Just before the departure of the presidential train, I sat with Mr. Burroughs in his compartment and talked with him about the trip.

"I wish you were going with me," he remarked plaintively. "I do not know how I am going to get along with all the rest of the party."

The quiet composure which was always a part of Mr. Burroughs' nature became more and more evident in his later life, when, as his writings indicate, his mind became more subjective and less objective. He still had a keen eye for every phase of Nature and still felt the thrill which followed the discovery of the first purple hepatica blossoming in the bare woods in early springtime, but he folded his hands and waited, gazing

with perfect faith and unclouded vision into the unknown. It was not with indifference that he peered into the future but he was willing to accept with supreme contentment whatever fate awaited him.

Perhaps John Burroughs' attitude on life and death are more deeply impressed upon my mind than anything else because these were the things we mostly talked about on the day I spent with him at Riverby, his home on the Hudson. These were the last hours I had with him before his death. We had been over to Slabside, the quaint two-story cabin down in the woods, where Burroughs wrote his later books, and I had sat at the same table where President Roosevelt had eaten huckleberrypie. We went down to the cabin and returned in an automobile which Henry Ford had given Mr. Burroughs and which the latter drove with some trepidation because, as he remarked, a horse has some intelligence but an automobile has no brains. When we returned to Riverby we went out upon the hillside where we could watch the fleecy clouds overhead. As we looked down upon the river we talked of the darker river which Burroughs, though we knew it not, was so soon to cross. I could not help recalling the verse in The long famous Rubaiyat of Omar Khayyam:

*Most of the nature books
tue me. They are Sensational,
or written to meet a sup-
posed want*

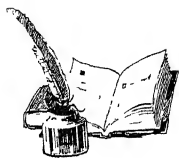
*Our popular periodical
~~monthly magazines~~ &
weekly publications & Sunday
papers seem trying to compete
with the moving picture
shows, or to give their readers
something that will make
little demand upon their
thinking powers as do the
movies. The movies are the
pest of our times. They are a
part of our hurry & shallowness.
Look back in our periodicals
ten years ago & see how much
more solid matter there is in
them than at present. The
monthly magazine vies with
the weekly for something. The
ephemera of the hour & the
weekly vies with the daily
paper—so little is there in
any of them that a reflective
man can sit by his own fire-
side & read.*

Thus did John Burroughs write to Mr. West of tendencies as he saw and felt them not long before his death.

So when the Angel of the
darker Drink
At last shall find you by
the river-bank
And, offering his Cup,
invite your Soul
Forth to your Lips to
quaff—you shall not
shrink

There was no shrinking in John Burroughs' soul. He felt that his days had been long in the land, that his life had been happily spent in well-doing, and that he had instilled into the minds of thousands upon thousands the love of Nature which had been his own inspiration. We talked of Nature and Nature's God. In the philosophy of John Burroughs Nature and God were one. As he talked to me, with the blue sky overhead and our faces bathed in the balmy air of a newly-arrived spring, he proclaimed his disbelief in a man-made, personal God, bowing in reverence at the same time to the omniscient, omnipotent Power that created and guided the universe. Nor was he disposed to question the untoward manifestations of Nature as the work of an outraged Deity. Floods, famines, volcanic eruptions, even wars, were all accepted by him as part of a great program which tended in the direction of ultimate good. "Our earth came through great travail to become a habitation for men," he said, "and there will be many another spasm before perfection comes."

"Most of the Nature books tue me. They are sensational, or written to meet a supposed want. Our popular periodical publications and Sunday papers seem trying to compete with the moving picture shows, or to give their readers something that will make as little demand upon their thinking powers as do the movies. The movies are the pest of our times. They are a part of our hurry and shallowness. Look back in our periodicals ten years ago and see how much more solid matter there is in them than at present. The monthly magazine vies with the weekly for the ephemera of the hour and the weekly vies with the daily paper—so little is there in any of them that a reflective man can sit by his own fireside and read."



We discussed immortality. Mr. Burroughs frankly admitted his agnosticism—that is, he did not know. Whether or not human personality survives bodily death was to him an unsolved problem, nor did he trouble himself to seek an answer to the question. “I do not know,” he said to me, “that I would really care to enter upon an endless existence. If death ends all, we can lie in our graves without lamenting our fate. If it does not, perhaps so much the better.”

John Burroughs, though dead, yet liveth. In many places his birthday is commemorated this month, and in the hearts of millions there is undying love for the man who opened the book of Nature and taught us

how to read its marvellous pages with intelligence and appreciation. Not mystical like Emerson, not rugged like Carlyle, not scornful of humanity like Thoreau, he made the world better by his sanity, his sympathy, his geniality, his love of human-kind.

Once I tramped with John Burroughs through a pine-forest, treading upon a carpet of needles, watching the fitful shadows thrown by the sunlight through the swaying branches overhead and breathing the perfume-laden air. As he lies at rest upon the bosom of his Mother Earth, I feel that I can say to him, as Andrew Lang wrote to Theocritus, “Nought hath thou found dearer in death than the fragrance of the pine.”

SPIDER vs. SNAKE

In Which The Arthropod Wins

by E. Anderson

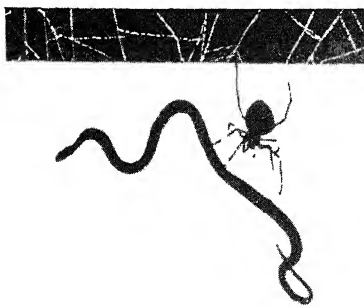
OUR dining room porch was festooned with the webs of several large orb-weavers, *Epeira*, and feeding the spiders was a standard just-after-mealtime diversion. One August day we came out from dinner just in time to see a small green snake fall into one of the webs. It thrashed about wildly and with great tail-sweeps broke many of the main moorings. Every minute it seemed as though the snake would certainly break free. But the web was gummy and no sooner had he whipped himself nearly loose than he would entangle himself in the meshes again. At last he hung quietly, securely fastened about his middle, and with a few stray meshes holding his head and tail.

All this time the spider had been waiting at the edge of the web, making one or two sallies towards the snake and then darting back quickly. It now made a rush forward, seized the small section of the snake which was fast to the web, and rather ineffectually tried to spread out its winding sheet in the usual fashion. Picture the plight of the poor, unreasoning spider, accustomed to prey much smaller than herself, when suddenly confronted with a beast so entirely outside her experience. It was as though a butcher while dispatching lambs should suddenly have met with Siegfried's dragon and have been forced to fight it with the meat axe. The spider fought

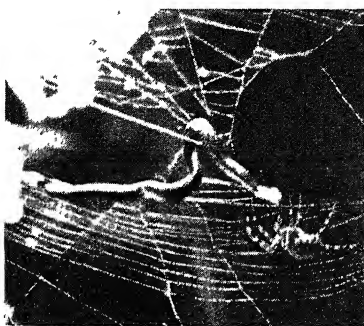
gamely but she was clearly up against a novel experience. After wasting great quantities of silk she had sheathed approximately an inch of the snake's long body in a tough silken case and had secured it with one or two guy-wires, sunk in her fangs for a trial bite, and ambled back to her home on the rafter.

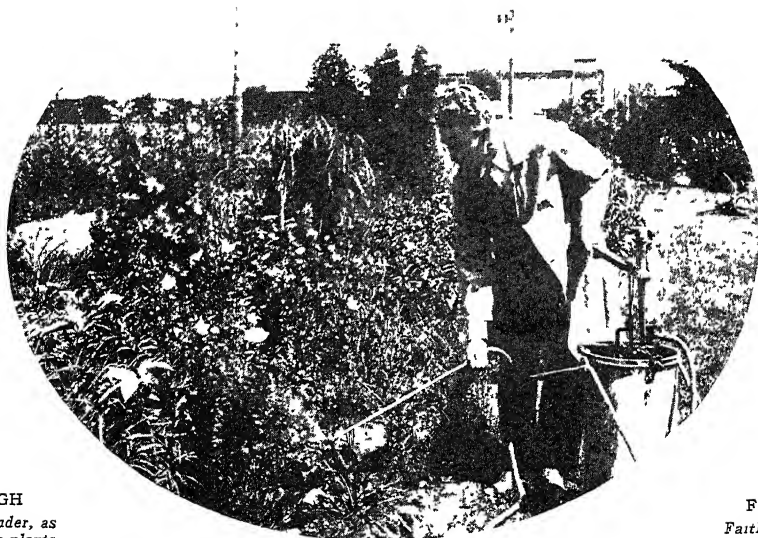
For a minute the snake hung quietly as before, then with one great sweep it cleared its tail from the net and would have broken loose if the spider had not hurried down and repeated her performance of wrapping a short section with the greatest care and leaving the rest of the body unsecured. Then another bite and back she went to the rafter. From time to time the snake would writhe and twist until it was almost free, and the spider would repeat its wrapping act. The fight raged for three hours. By four o'clock the snake was sheathed for nearly its entire length in a tough silken shroud that swung perilously in the remnant of the original web. The spider was now noticeably running short of silk but her bites had begun to take effect and the snake made only an occasional quiver.

An hour later the snake was apparently dead and the spider had begun to hoist her prey above the web. At supper time we noticed her feeding on the victim. Next morning nothing was left but the shrivelled remains of this large feast.



THE DEATH THROES
The spider wrapped a little, then bit the snake, then ambled home to await results





BE THOROUGH
Direct the spray under, as
well as on top of the plants

FOLLOW ORDERS
Faithfulness to directions
is more than half the battle

Doctoring Plants

How To Fight the Battle of Your Garden

by C. T. Gregory
Purdue University Agricultural Extension Department

This is another of a series of articles by C. T. Gregory,—a recognized plant authority,—on Doctoring Plants. In subsequent issues, he will diagnose the diseases of irises, peonies and asters, giving direction for caring for them.

PLANTS cannot talk, neither can they move. They have no way of letting us know of their ills nor have they any way of avoiding them. As lovers of flowers and trees, it is our duty to protect them against the attacks of a vast army of disease germs and pests.

Unfortunately the needs of protection are many and varied. There is no single panacea to cure all ills. However, in every case the method of controlling any disease is based upon a careful study of the trouble and of the fungus, bacterium, insect, or condition that may be producing it. The specific remedies for various diseases of our plant friends will be given in subsequent articles, but first we must consider the medicine needed.

Most plant diseases are caused by fungi or bacteria which are also plants. Hence the question of disease control becomes a matter of killing one plant on another plant. The treatment must be so balanced that it will not hurt our friend but will kill the enemy. This means that the directions for control must be followed faithfully. Do not make the mistake that many growers have made in thinking that if a little is good, more will be better.

A second vital consideration is that fungous parasites are extremely tiny plants and are easily scattered by wind or water or are carried by insects. Being so small it is as easy for them to attack the lower surface of a

leaf as it is the upper surface. This means that in dusting or spraying to kill the disease the job must be done thoroughly. Do not be content to merely wet the top of the leaves. Such measures are worse than useless. The plant lover thinks he has protected his friend when actually no good at all has been done.

So the first admonitions of the plant doctors are—be thorough but follow directions carefully.

The valuable medicines are not really so numerous. They may actually be boiled down to these: copper compounds, sulphur and its compounds, mercury compounds, formaldehyde and heat. For insects, these same materials may be used but the arsenic compounds like lead arsenate and calcium arsenate, and the nicotine preparations like nicotine sulphate, must be added. Scale insects are best killed with 1-10 lime sulphur spray or with a 3 per cent lubricating oil emulsion or one of the miscible oil sprays.

The oldest and best known spray material is Bordeaux mixture, a compound of hydrated lime, copper sulphate and water. The plant doctor usually speaks of this spray as 4-4-50 or 3-6-50 or some similar set of figures. These merely mean pounds of copper sulphate represented by the first figure, pounds of hydrated lime by the second figure, and gallons of water by the last figure.

The sulphur sprays are usually in the form of a mixture of lime and sulphur boiled together to produce the polysulphides of lime. These are dark orange-brown in color. In speaking of such sprays the doctor advises lime sulphur 1 to 10 or 1 to 50, meaning one gallon of

the concentrated lime sulphur in ten or fifty gallons of water. Most druggists do not care to handle this liquid because it may eat the container and leak out, producing an unpleasant odor. So there has been developed a form of dry lime sulphur which is about as effective as the liquid. It is easily dissolved in water and should be used at the rate of three pounds of the dry lime sulphur as equivalent to one gallon of the liquid preparation.

If the proper materials are used a dust is usually better than a spray. It much more readily covers the plant than does a liquid.

To replace Bordeaux spray there is a mixture known as copper-lime dust. This is actually Bordeaux without the water and when applied to a dewy plant will change to Bordeaux immediately. Most of the companies making spray materials will have this mixture. It can be added to the arsenical insecticides or with a nicotine compound if needed. Moreover, it is much superior to dry Bordeaux used as a dust.

Sulphur is commonly used as a dust for all sorts of diseases of flowers, shrubs and trees. The only precaution that need be added here is that nothing but the special dusting sulphur be used. Sulphur flour or flowers of sulphur are not fine enough for disease control. This dust is also mixed with various insecticidal compounds with complete success.

Formaldehyde is a gas dissolved in water at a forty per cent strength. It is one of our most valuable materials for seed and soil disinfection. It usually is used at the rate of one pint in twenty-five or thirty gallons

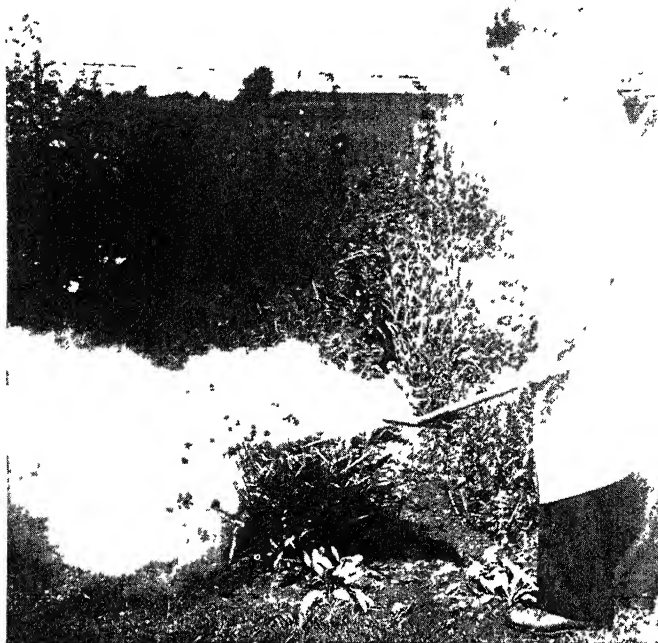
of water. It can be purchased at any drug store. The seed is soaked in this solution anywhere from thirty minutes to an hour, depending on the resistance of the seed. For soil disinfection the space to be treated is spaded up thoroughly and well pulverized. The solution, 1 pint in 25 gallons, is then poured on the soil at the rate of one gallon per square foot. The gas is allowed to act in the soil for a week, then the soil is loosened again

and allowed to stand at least another week before it is safe to plant.

The mercury compounds rate highest in their fungicidal value. Corrosive sublimate, known to the chemist as mercuric chloride, is particularly valuable. It is used at the rate of one part in one thousand parts of water (1-1000) or one ounce in 7½ gallons of water. Special tablets can be purchased at drug stores made up so that one tablet in a pint of water gives the required strength. This mercury compound is poisonous. It should not be mixed in any metal container.

Recently certain organic mercury compounds have been developed and are sold under various trade names. These are often quite effective in seed treatment but their particular value lies in the fact that they can be used on growing plants to check various root and stem rots without injury to the plants. The strengths of dilution are given on the container, they are usually one quarter of one per cent solutions.

These are the principal medicines. Now we must learn how to diagnose the cases, so as to select them.



APPLYING THE PROTECTING COAT

Dusts are more effective than sprays. They should be added when plants are wet with dew.

We have had ample proof in the past of the real interest of the readers of Nature Magazine in garden articles. In the past we have presented stories of various of our popular garden flowers, and will in the future. The present series by Mr. Gregory is designed to aid in protecting the flowers of your garden against their various enemies. Each month the excellent department by Romaine B. Ware will be found in the back of the magazine. It is designed to be of real practical assistance and is written by an expert. We would welcome any suggestions from our readers with respect to such garden features as we offer—and any criticisms. We want these features to be thoroughly serviceable.

"TAKING OFF" FROM
LAYSAN'S BEACH

The albatross, with great scattering of sand, gains momentum for his flight



THE LOVE BIRD SAILS
THE BLUE

The purest white, except for black eyes and leg-feathers, they are striking birds



(Above) THE LONE HAU TREE IS PEOPLED
The usual booby tenants roost on this ancient iron-wood former inhabitants planted

DWELLERS on the REEFS

Birds of the Northwest Hawaiian Islands

by Lorin Tarr Gill

Photographs Courtesy Bernice P. Bishop Museum, Honolulu

ONE OF the most populous bird colonies in the world dwells on a drab, lonely chain of widely separated volcanic remnants, sand islands, reefs and shoals northwest of the main Hawaiian Islands. Huge rocks hung with precipitous cliffs, coral atolls surrounding lagoons, and bare reefs washed by the ceaseless tides,—these land prominences extend to the northern limit of the coral belt, some 1380 miles from Honolulu. With the exception of the station of the Commercial Pacific Cable Company at Midway, all the islands are known as the Hawaiian Bird Reservation and are under the jurisdiction of the Bureau of Biological Survey of our Department of Agriculture.

Birds hover over each in a veritable cloud. There are red-tailed tropic birds, man-of-war or frigate birds, albatrosses or goonies, boobies, petrels, shearwaters and terns, and, in addition to the large list of regular residents, there are thousands of others which visit the islands each winter,—the tattler, plover, curlew, turnstone, canvasback, shoveler and a dozen or more types of occasional or accidental wanderers.

It is Laysan Island which, today, harbors the greatest multi-

tude of feathered creatures. This small sand ring in the midst of the Pacific is the regular home of at least twenty species, five of which, during recent years, were found nowhere else in the world.

Formed like a great oval platter, the island holds, dish-like, a shallow salt-water lake which varies in size with the amount of rainfall. The low sand rim slopes gently toward the sea without and the lake within, forming a double beach about three-quarters of a mile wide, and there a few varieties of hardy plants have established themselves, helping, with their roots, to hold the sand in place and adding to the ideality of the island as a home for the monstrous bird population.

DURING 1929, Kilauea, the famous volcano of the Hawaiian Islands, burst forth in two spectacular lava flows, and Dr. Jaggard, the earthquake expert, believes that these Pacific Islands may be due for several years of interesting subterranean change. A third lava flow in Kilauea is expected early in 1930, with the return of lava for an indefinite period. It will be interesting to follow coming events in the light of the several articles Nature Magazine has had on this volcanic group.

Upon the arrival of the members of the expedition organized by the Biological Survey and the Bernice P. Bishop Museum of Honolulu, which visited the bird reservation aboard the naval mine-sweeper *Tanager* in 1923, Laysan's aspect was one of desolation, wind-swept and sand-piled. Two lonely and wind-bent coconut palms stood, sentinel-like, before a group of tumbledown shacks abandoned years before by guano workers, the island, which had been well-covered by vegetation,

(Right) A FRIG-
ATE BIRD
ROOKERY

Most available
space is taken
These birds are
great robbers

OFTEN AN UN-
WILLING SAC-
RIFICE

Young boobies
like this one are
endangered by
predacious frig-
ates



hundred remained to face the same lingering fate, and, in the certainty that the chance transportation of a pair to other isolated spots would produce the same result, the lives of the survivors were sacrificed and Laysan was once more given the opportunity to clothe herself in green.

Yet, in spite of the depredations of the four-footed colony Laysan was literally alive with birds. The memory of thousands of flapping wings, the incessant screams from hundreds of lusty throats, and the all-pervading odor of guano will live forever in the minds of the visitors to the lonely shores.

Not only the air, but the one stunted hau tree, an ironwood planted by the former inhabitants, the scanty patches of shrubbery, and the earth for as far as six feet underground were all alive with birds. Almost every foot of land clear to the water's edge was occupied and the struggle, often for mere nest room, was intense.

Some of the petrels dig holes five or six feet deep and in them live hundreds of the night-flying type; another species makes holes but two or three feet beneath the surface of the sand, and above those are the burrows of the wedge-tailed shearwater. The surface of the ground is the most densely populated, dozens of birds live under the bushes, in the roots of the grass, and in the open spaces along the shores of the lake and seaslope, occupying their hard-won sites to the fullest capacity. Terns, boobies, and man-of-war birds pre-

was nearly bare.

It was appallingly evident that rabbits, introduced in all innocence by the foreman of the workers in 1902, had increased until they had overrun the atoll, had denuded it, and then slowly starved. But a few



empt the choice top flats in the bushes, contending among themselves and their neighbors for desirable locations. Most of them are without fear and may be lifted from their nests like setting barnyard fowls.

The bulk of the population is composed of Laysan albatrosses, beautiful and white-breasted, with black wings. The black-footed type, with dark plumage and known as the sooty albatross or gooney, is also there in lesser numbers.

For four months the albatrosses roam over the ocean, but in October they begin to return to Laysan. All through the winter months and until the young are ready to leave with their parents the following spring, the island is covered with them. Looking in any direction one may see the old birds standing stolidly about, sitting on their selected hollows in the sand or engaged in the dance for which they are justly famous and which, in varying figures and maneuvers, continues all the time—the "albatross walk" or "gooney foxtrot." Wonderful in flight, they are clumsy afoot and lurch out of one's way like shambling old men ready to depart this life.

HERE IS A YOUNG TROPIC BIRD

Below is one step in the "albatross walk" or "gooney foxtrot." One can almost hear the long-drawn-out groan.



The adults devote much time to the rearing of a single downy nestling which issues from a brownish-white egg about the size of a goose egg, it is so exactly like thousands of other albatross chicks that it is almost inconceivable that either parent, returning from fishing at night, can so readily distinguish it. Yet the old bird proceeds unerringly to its young and disgorges a mass of partially digested squid and oil, the young one inserts its bill crosswise in that of the adult and receives the offering with relish.

The nesting habits of the frigate birds have gained for them the most undesirable of reputations among their fellows. The male lures his mate to a chosen nesting-site by the display of his flame-colored throat enlargement, which, during the mating season, bears a close resemblance to a child's toy balloon. Then the building of the rude structure of sticks and vines is begun. The two steal from their kind in utter disregard of the ordinary rules governing the possession of building materials, and when both owners of a neighboring nest leave it at the same time, if only for a few moments, it is greedily carried off. Both parents sit on a single, large white egg, seldom leaving it for an instant day or night for fear it will be broken and the nest stolen. They are forced to keep even a closer watch over their single, naked chick.

In securing their daily rations the frigate birds have acquired a skill which makes the acts of an ordinary highwayman seem commonplace. They establish their colony near a booby settlement and there they patrol the island and sea, lying in wait for their industrious neighbors or the shearwaters as they return from fishing expeditions. Often a flock of them attack a single victim until the harassed and fish-laden one lets go his

catch piece by piece and, more often than not, after a hard day's work, arrives at his nest exhausted and with never a morsel for his hungry youngsters.

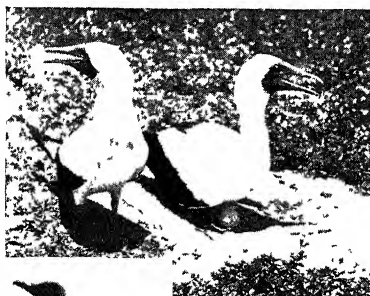
During the calm days of summer when the sea is so smooth that the booby is unable to bring home its usual catch of flying-fish, the man-of-war bird not only resorts to cannibalism, but infanticide as well, seizing the unguarded young of its neighbor, carrying it high in the air and dropping it, and then swooping down to devour it at a single gulp.

The land birds on Laysan have suffered with the plants, yet remarkable among them are the types which, in their native state, were formerly peculiar to the island. In other years the shrubbery included in the less than two square miles of area gave protection to the tiny flightless rails, *Prozanula palmeri*, a reed-warbler, known as the miller bird, *Acrocephalus familiaris*, and two species of the Hawaiian Drepanidi-



FRIGATE BIRDS ON NECKER ISLAND

The male at the right has the characteristic seasonal throat enlargement which attracts the female.



FATHER AND MOTHER BOOBY ON GUARD

Below is a quarter-grown gannet, a marvel of fluffy whiteness.



dae—the Laysan finch or "canary", and the smaller Laysan honey-eater, *Hamatone freethi*. The lagoon afforded harbor to a number of Laysan teal.

Upon the arrival of the members of the Tanager expedition, but a few dozen finches remained to delight the visitors with their songs, just three honey-eaters were seen and those, it is said, perished in a sand-storm, the miller bird had disappeared entirely, and two lonely rails were nesting in the thick stems of the bunch grass. Of the ducks, which have never been numerous of recent years, less than twenty deserted themselves in the waters of the lagoon.

The depleted rail colony was later increased by the introduction of eight members from Midway where the peculiar birds have existed in great numbers since their intro-

duction about thirty years ago, the finch, miller bird and honey-eater were all thriving at the cable station.

Though it is a common belief that the rails are wingless, in reality their wings have become so reduced in size as to be almost hidden in the body feathers and so weak as to be useless to raise them from the ground more than three or four inches, yet, outspread and flapping, they contribute greatly to running speed.

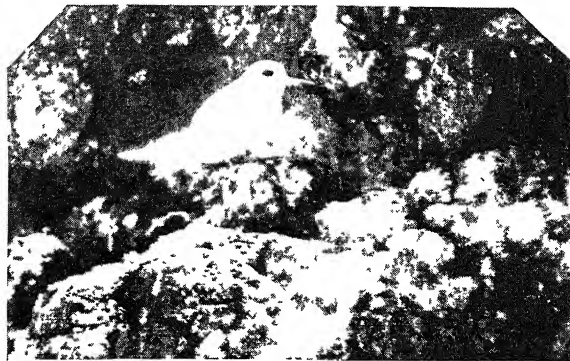
It is not known how the active little rail first came to Laysan as the species has no near relative with a wide-flying range, it is considered probable that its ancestors arrived long ago by accident, having, perhaps, been lost at sea during the season of migration. Finding Laysan small but well-stocked with food and without serious natural enemies, the birds doubtless settled down to live the island life and, having little use for wings, gradually lost the power of flight.

The "canary" is the best songster, having a peculiar



THE BLACK-FOOTED ALBATROSS

A portrait Such was the bird the Ancient Mariner shot, and caused the terrible calm



ON NIHOA'S VOLCANIC CLIFFS

The white tern or "love bird" proves to be tame and tractable before the camera

note that lacks the warble of the domestic bird. The male is beautifully mottled in gray and white with greenish-yellow head and breast, the female lacks his color and is quiet. The peculiar egg-eating habits of the species insure them a long life on Laysan.

The honey-eater is the Laysan form of the apapani, which is common in the forests of the higher islands of the main group. In that it is small and red in color and has a long, slender curved bill and tube-like tongue with which it drinks the sweet fluid from the blossom of the portulaca, it clearly resembles its better-known relative.

Ornithologists have been most interested in the miller bird, so-called because of its fondness for certain types of moths found on the guano islands. It is a new, well-marked species and the only representative of its ex-

tensive family of insect-eating birds to be found in Hawaii. All of its relatives capable of making extended flights by sea are widely distributed in Australia and China and on the various Pacific islands. Brown, and only a few inches in length, it often breaks into a sweet melodious warble which, it seems, is all out of proportion to its size.

The sportsman finds it almost impossible to believe that a single species of duck should make so small an island its only home. A close relative of the Hawaiian duck, it is perfectly fearless, yet, as it is a poor flier, it remains within a few yards of the lagoon.

Some observers have said that the bird shows degeneracy due to inbreeding; its survival at all, in view of the ordinary hardships of its life, is a marvellous fact.

FEATHERED FISHERMEN OF HAWAII

They capture their prey by flying close to the ocean and swooping down on all unwary fish in the surface water



"ON WESTERN TRAILS"

No lover of Nature and the outdoors should fail, in making his or her vacation plans for 1930, at least to consider the Nature trips organized by the American Nature Association to Jasper Park and the Inner Passage of British Columbia, to Glacier National Park, the Yellowstone and the Southwest. These are presented as a service and not as a commercial enterprise and they offer something that can not be elsewhere duplicated. Send for a copy of "On Western Trails"



PRESENTING BLARINA

The Tiny Terror of the Woods

by A. Brooker Klugh

A CHARACTERISTIC POSE
Blarina sniffs the air, while his whiskers feel each breath of wind

BLARINA the Terrible! Who can and does capture and kill nearly twice his weight in mice! Who travels through the leaves and humus of the forest floor at the rate of a foot a minute! Who escapes the notice of many who believe they have knowledge of all the little folk of the woodland!

Blarina, whose full name is *Blarina brevicauda* is the short-tailed shrew common to the eastern North American forests. He is more active at night than during the day, and travels about beneath the dead leaf and moss carpet of the woods, rarely exposing himself for more than an instant.

He is about five inches in length, this little fellow, with a tail only an inch long. Dark brownish-gray above, his fine, glossy coat shades to a paler color on the under surface. Not much in the way of ears has he for they are not visible externally. His eyes are very small, and his snout is long and pointed.

In the case of such an elusive little mammal as Blarina it is doubly difficult to determine how numerous is his kind. I know, however, that there are few pieces of woodland in which one cannot, by prolonged watching, catch a glimpse of him. Seton estimates that in a wood at Cos Cob, Connecticut, there were certainly fifty of these animals to the acre, and Shull, who has made a detailed study of the species, estimates that there are at least four of these animals to the acre throughout the range of the species.

The short-tailed shrew excavates burrows which are from an inch to an inch and a quarter in diameter, and which vary in length from five feet to several yards. The tunnels are usually tortuous, with several side-branches which often connect with one another, and some portions of the tunnel may be as deep as sixteen inches below the surface of the soil. The tunnels have two or more openings which go down at a steep angle for some six to eight inches. At some point along the tunnel is placed

the nest, composed of grass, sedge, or leaves. Here hollow balls from four and a half to six inches in diameter, with walls half an inch to an inch and a quarter in thickness, are hollowed out. As shown by Shull, although the nest of the shrew resembles that of the meadow mouse, none of the coarse material of which the nest is composed is shredded by the shrew as is done by the other woodland creature.

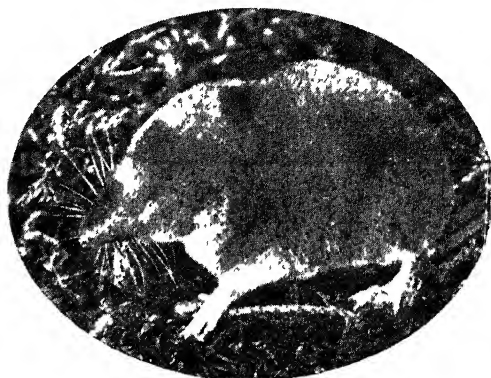
Blarina burrows by strong outward and backward strokes of its front feet and forces its body through the soil like a wedge. It has been found that in loose soil a shrew had no difficulty in burrowing at the rate of a foot in a minute, and I have noticed that when burrowing beneath the mossy carpet in the woods they often progress at a rate of about a yard in fifteen seconds.

Comparatively little is known of the domestic affairs of the little animal. Merriam, Seton, and Shull all record finding a pair of this species together at various seasons of the year, so that there is a possibility that they mate for life. Two or three litters of from two to six young are produced in a season,

and young have been found from late April until late September.

Both summer and winter are busy times for the shrew. In winter it not only burrows about beneath the snow,

A Brooker Klugh, M. A., Ph. D., who is now Assistant Professor of Biology, Queen's University, Canada, follows the career of Nature photographer only as an avocation. His main interest lies in plant and animal ecology,—the effect of physical factors of habitats on the forms of life therein. At present, he is devoting most of his attention to light's effects on living organisms. In his hobby, he has developed many new methods for under-water, insect and flower photography, and is Nature editor of American Photography. He is a frequent contributor to Nature and other magazines.



AN ALERT LITTLE BURROWER
He travels underground at the rate of a foot in a minute, if conditions are right

but makes long journeys over the surface, burrowing down whenever it comes to an elevation which indicates the presence of a log or stump, to feed, as is assumed by Merriam, on hibernating insects and pupae

The creature's voice is, like that of all shrews and bats, high-pitched. Sometimes it utters a single shrill note, but more usually it emits a continuous twittering sound. A pair which came into my tent night after night at one of my campsites in northern Ontario kept up a continual twittering as musical as the notes of the American goldfinch.

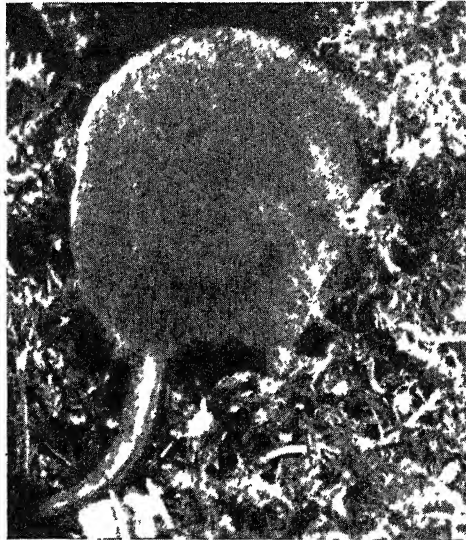
Blarina is mainly carnivorous and insectivorous, although at times it eats vegetable food, including beech-nuts. Its main diet probably consists of large numbers of insects which it takes in the adult, larval and pupal stages. Shull found that an individual of this species required fifteen adult May beetles or June bugs, as they are often called, as a day's rations. An individual which I kept for a time ate three large specimens of the two-striped locust in five minutes, and this same animal devoured six of these locusts, two crickets, a caterpillar, and forty-five smaller insects, in the course of a day. In capturing the large insects it always seized them by the head, which it crushed eagerly with a loud crunching sound.

Mice stand as a close second to insects in the diet of the short-tailed shrew, the species most frequently captured being the meadow mouse, an animal nearly twice the size and weight of the shrew. In attacking it exhibits much ferocity, strength and persistence. Morden, who was one of the first to describe the habits of this species, says "Four large meadow mice were procured and placed in the boiler with the mole-shrew, which as soon as it met a mouse showed fight. The mole-shrew did not seem to see very plainly and started round the boiler at a lively rate, reaching and scenting in all directions. The mice seemed terror-stricken, momentarily rising on their hind legs, looking for a place to escape, squeaking in their efforts to keep out of the way of the mole-shrew, which pursued them constantly. The shrew's method of attack was to seize the mouse in the region of the throat, which it did by turning its head as it sprang at the mouse. The mice would strike at it and usually knock it away with their front feet. The shrew at last attacked one mouse and stayed with it, and in about ten minutes had it killed and commenced eating the eyes and face."

Merriam found a short-tailed shrew weighing 112 grams could tire out and overcome a vigorous deer mouse weighing seventeen grams, the shrew taking half an hour to exhaust the mouse and another half hour to kill it. It does not seem likely that a shrew could catch the mice on open ground, but it undoubtedly captures them in their burrows. The fact that under natural conditions a

considerable part of the diet of Blarina consists of these animals is shown by the finding of the bodies of two freshly-killed meadow mice and that of a third partly eaten, as well as several handfuls of hair in which were mixed tails and legs enough to account for about twenty more, at the nest of a shrew investigated by Shull.

The items of food which rank next to insects and mice in Blarina's diet are snails and earthworms, and the relative number of these eaten depends on the locality and the season. Shull found that in a tract of low land this species fed very largely on snails in winter, the main species eaten being the white-lipped land snail.



ABOUT TO DISAPPEAR
Frightened, Blarina makes for home, displaying the tiny tail for which he is named

The snails were gathered and hoarded in piles. They were moved to the surface, just outside the burrow, when the temperature fell, and back into the burrow when the temperature rose, thus being kept in the coldest place available, and therefore remaining in an immobile condition. Shull also found that though empty shells were sometimes brought to the surface, they were not taken down again, and his experiments indicated that the shrew distinguished between empty and inhabited shells by odor, or possibly by odor combined with weight. That weight alone was not the means of discrimination was shown by the fact that shells

filled with soil until they weighed exactly the same as an inhabited shell were not taken into the burrows. Sometimes the shell was broken to get at the snail, but frequently the animal was dragged out without damaging the shell. About one hundred and twenty snails formed a month's rations.

In places where earthworms are abundant they undoubtedly constitute an important item in the menu of Blarina, and Shull discovered that when these alone were fed to a shrew it required thirty-five worms, about two inches long when contracted, to serve for a day.

The voracious fellow also eats other animal food, such as sowbugs, and Merriam mentions that it hoards and eats beechnuts, while Plummer says that a specimen which he had in captivity ate corn and other grain. Shull found that it would not touch vegetable material as long as animal food was available, and it is probable that under natural conditions vegetable food is very rarely taken.

Among the enemies of the short-tailed shrew are foxes, minks, weasels, hawks and owls, and snakes. The three mammals mentioned sometimes kill shrews, but apparently rarely eat them, probably because of their rank odor, and it seems that they are seized in mistake for a mouse. Four species of snakes are known to eat them, but only to a very limited extent. Hawks and owls are their chief enemies. Shull records that a shrew which he had in captivity for five weeks became entirely ob-

livious to sounds, even of considerable intensity, which were often repeated, with the exception of the flutter of the wings of a pigeon which was kept in the same place. This sound always sent it scurrying to its burrow, and though it must have heard it hundreds of times, it produced as great a disturbance of the shrew's equanimity at the end of the period as it did at the beginning.

The shrew's sense of sight is extremely poor, and serves merely to distinguish light from shadow, as is shown by experiments by Kennicott, Merriam, Shull and myself. Its senses of smell and hearing, however, are acute, and the former sense would seem to be the main one employed in locating food and the latter in escaping from its enemies. Likewise, it is very sensitive to touch, the "whiskers" especially being important organs. The lightest contact, even with a current of air, is responded to immediately.

When out foraging the short-tailed shrew runs about with its nose held rather high, investigates every nook and crevice, and smells over any object with which its whiskers come in contact. When out in the daytime it

keeps as much as possible in the shade, and the intense light and heat cause it serious discomfort if it is exposed to full sunlight for any length of time.

Such a ferocious little beast might reasonably be expected to prove entirely untamable, but I found that an individual I possessed for some time, and handled a good deal, became markedly less savage and ready to bite in twenty-four hours, while Plummer kept one which soon became quite tame, taking food from his hand. It learned to come at call and never failed to respond, except when in its nest, and apparently very sound asleep, in the middle of a hot summer day. When running about it usually kept close to the wall, or under furniture, but it would come out into the middle of the room if called. This act of overcoming its natural aversion to open places shows how greatly its mode of behavior had been changed by good treatment.

A curious little fellow—this shrew. It would take years to learn all about him, but even a short study will serve to prove him interesting and unusual—the "terrific little tyke" of the woodland floor.

CATS—

by A. B. Brooks



HER ADOPTED CHILDREN
These little woodland pussies got the same treatment as the brood Tabby bore herself

and CATS

And the Breeds

Stick Together

ON AN early summer day two boys and their dog, following a path through

the woods, came to an old field overgrown with weeds and clumps of brush. Underneath a decaying oak stump a woodchuck had made its hole and Collie, in his round of inspection of all the woodchuck holes about there, finally came to this one, put his nose down deep into it, suddenly jerked it back, and then began to dig furiously. Within a few minutes out came a black-and-white skunk, dragged by the sharp teeth of the collie and, after a brief tussle, there was one less skunk and one wiser dog.

Presently the boys came up and, peering into the hole in which their dog had been digging, they saw four glossy little skunks, their eyes not yet open, squirming about in the nest which had been uncovered. Realizing that the young creatures would soon perish from starvation if left to themselves, the boys carefully placed them in a hat and carried them home. "Mercy on us," said the boys' mother when she took a look at what the hat contained,

their gray cat and her family in the cellar house. "These are pole cats," said they, "and we'll put them in the nest with the kittens and make real cats out of them." And this is what they did.

Then the boys watched to see what would happen when the mother cat returned from a hunting trip down at the barn. They were afraid she would disown the newcomers and would remove her own family to other quarters. But nothing of this kind happened at all. She may have been surprised when she looked in the nest but if so she said nothing about it, or showed no sign

of it, and lay down purring in the scanty space left for her.

Now the eight youngsters, four of each, almost exactly of the same size, having no partiality shown to any one of them, are growing up, playing, sleeping, and feeding together, as any cat family should.

Perhaps it is this intense mother instinct that has carried the cat family throughout the earth in its history.



IT'S MEALTIME IN THE BARN
And the four orphans share as well as the four domestic infants, as may be seen

LOOKING A MOLE
CRICKET IN THE
EYE

*Note the hand-like front
legs, used for digging*



HE'S AN INSECT
WITH A MOLE'S
HABITS

*The farmer finds him de-
structive to field crops*

An Underworld Character

The Mole Cricket is Especially Built for Destruction

by A. B. Champlain

of the Pennsylvania Department of Entomology

THERE are certain creatures of the underworld having no desire to attract attention, that invite comment in spite of themselves. Sometimes it is a lawless disposition on their part, again it may be a physical characteristic that makes them notorious, but not often does it happen to be a leg. In the case of the mole crickets, *Gryllotalpa*, whose history we are about to consider—they are especially notable on account of their peculiar and powerful fore-legs.

Mole crickets have lived underground so long that their leg structures have become greatly modified for the purpose of making tunnels like the mole. Although considerably smaller than that animal, these insects of the true cricket family, having a mole shaped body and fore-legs and mole-like habits, are appropriately named.

Making their homes in loose sandy places or in rather damp soil near streams or ponds, these insect diggers construct long underground chambers about the size of a lead pencil, throwing up little ridges as they proceed. It is to fit them for this method of progress that they have been provided with the shovel-like fore-legs that resemble somewhat the human hand. These sharp, strong claws are also made use of for cutting roots. In addition to this they have a thorax or chest that is strong and powerful for pushing through these galleries.

Some of these indefatigable burrowers construct gal-

leries six to eight inches below the surface. It is during these activities that the roots of plants are injured. Though they feed generally upon tender roots, sometimes on potatoes or other field root-crops, it is said that they are partially carnivorous and will eat any soft-bodied insects that they come upon in their travels underground.

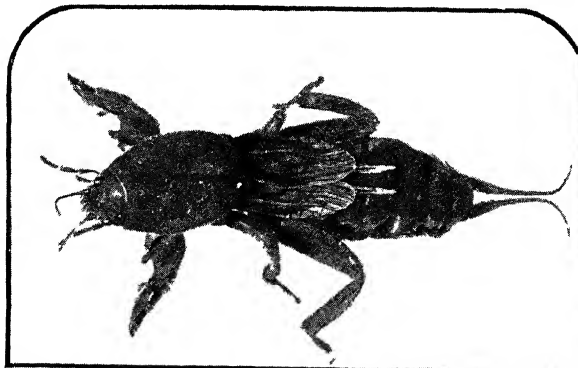
Sometimes they become destructive pests, and then these burrowers attract attention—especially when gardens are near to streams. When sufficiently numerous to be a menace to crops they may be destroyed by poisoned baits. Or if wet or damp soil is drained they will soon cease to bother.

These curious subterranean creatures sometimes attain a length of one and one-half inches, they are seal-brown or cinnamon brown in color and are covered with fine velvety hairs of the same shade. Mole crickets have six legs as do all insects, however the hinder four are not abnormally developed. With wing covers that are small in proportion to their bodies, we may find that the wings when unfolded are ample for a diplike flight. Although they are lovers of the dark, mole crickets are sometimes attracted to artificial lights and have been found at the arc-lights on city street corners.

Mole crickets are usually solitary except at mating time. The mother cricket deposits from 200 to 300 eggs in a round cavity or nest deep in the ground.

AT HOME IN LOOSE
SANDY PLACES

*Note the vigorous digging
equipment*



A SUBWAY ENGINEER
OF PARTS

*Underground living changed
his structure*



WHEN MOONLIGHT COMES TO MALIGNE LAKE, JASPER NATIONAL PARK
Most "moonlight" pictures are actually daylight pictures taken against the sun, but this is a real moonlight picture taken by Dr Harold A Bulger of St Louis, a member of one of our 1929 parties. He used an Auto-Graflex to get this remarkable effect of this lovely lake on whose shores the 1930 parties will camp while in Jasper

WESTERN TRAILS

IT is apparent, not only from the number of requests for the booklet, "On Western Trails", which describes the American Nature Association trips for 1930, but from the number of immediate reservations as well, that the Association is rendering a real service. Among the worthwhile people who make up the readers of Nature Magazine, there is a definite desire for summer vacations of a different and constructive character. Out of the experience gained on its various expeditions,

the American Nature Association is happy to be able to meet this demand

In selecting Jasper Park as one objective, those in charge of the trips were motivated by the newness, in point of accessibility, of this Canadian outdoor wonderland. Its richness in resources of Nature has as yet been unfolded to few, and both parties while in Jasper will be accompanied by a distinguished Canadian naturalist. The Inner Passage of British Columbia, several years

ONE OF MANY SPECTACULAR POINTS ON MOUNT CARMEL HIGHWAY
Those who know say that there is no more remarkable scenic highway in the world than the Mount Carmel Highway into Zion National Park. It will be opened for the first time this year and the American Nature Association party in the Southwest will travel over it both ways, in and out of Zion Park.

COURTESY THE UNION PACIFIC





ARTHUR NEWTON PACK

IN THE ISLAND-FILLED WATERS OF THE INNER PASSAGE

For seven days the Nature Magazine parties will cruise on their two private yachts among the islands and along the wilderness shores of the British Columbia mainland. Here is truly a primeval country where mountains come down into the waters of the passage and untracked forests line the shore.

ago the scene of an Association expedition, recommended itself also by its primitive and unexploited character. There man has made but little mark, there one can discover the feel of a primeval wilderness.

Glacier Park holds so many charms for the type of party which enrolls for the Nature Magazine trips, and was so unanimously loved by the 1929 groups, that it is again this year a focal point. Two of the parties will penetrate north into Glacier,

OLD FAITHFUL

There are those who rightly feel that a lifetime has not been complete without seeing this glorious geyser in the Yellowstone and others of the many wonders that abound in this park and that two parties will visit this year.

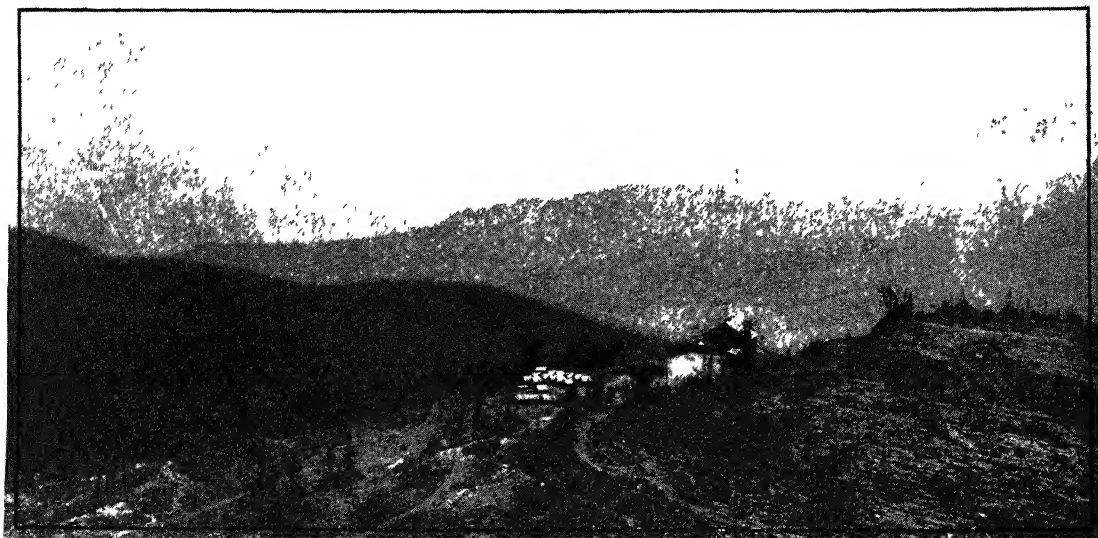


following spectacular trails into that section rich in wild life.

To have been West and not to have visited the Yellowstone is unfortunate. The most visited of all the destinations of the 1930 parties, Yellowstone National Park holds, nevertheless, so tremendously much of distinctive natural history interest that both July and August parties were felt advisable. The isolation from crowds will not be as complete there as in the other places, but

IN GLACIER PARK

Looking down on the chalet at Granite Park, one of the places where the members of the Nature Magazine parties will stop, away from the usual tourist routes. Once on the trail in Glacier the parties are in the back country.



that is testimony to the particular attraction of the Yellowstone

The Southwest is full of charm and interest and logically the choice of the Association for one of its trips. Feeling that once there one should see as much as possible within the limits of time and ability to see thoroughly, the trip to the Southwest was planned to include the Indian Detour, the Grand Canyon, and Bryce and Zion Canyon National Parks

Each one of the parties will be accompanied by a representative of our Washington office who will take care of all details, but there is nothing formal in any sense about these trips. A program choke-full of interest has been provided for each trip and is there for the members of the parties to take advantage of. If, however, one feels like varying the plan now and then that is one's privilege. Being limited in size, the Nature Magazine groups are more or less family parties



WILLIAM L. FINLEY

A STOP ALONG THE INNER PASSAGE

The private yachts of the party are equipped with canoes and other shore-going facilities to permit the exploration of alluring bays and inlets and fishing for the salmon and other fishes for which this region is justly famous. Here is a stream of glacier waters tumbling down from the mountain side.

THE FAMOUS INDIAN PUEBLOS AT TAOS

This will be one of the places visited by the Nature Association's Southwest party on its three days in the Indian country. Headquarters will be made in Santa Fe, from where trips will be made before the party moves on to the Grand Canyon and thence to Bryce and Zion Canyon National Parks.

out for a good time and to get really to know the country they are visiting. In outdoor clothes, a knapsack as only baggage, one feels the shackles of civilization, convention and formality completely left behind. A bit of a stubble on the chin or hair with no wave just adds to the joy of the open and of the trail. The trips of the Association are therefore quite different from usual tours.

All of these trips are described in detail in the booklet "On Western Trails." There will be found, also, a statement of the objectives of the American Nature Association in providing such non-commercial and specialized trips, for limited groups of people having a community of interest. The booklet sets forth very definitely the type of people who will be welcomed to such parties, —people who by nature and inclination are able to dedicate themselves to the fellowship of the trail, than which there are few more thoroughly happy fellowships.

COURTESY ATCHISON, TOPIKA & SANTA FE



THE GOLD-BANDED LILY OF JAPAN

THERE is certainly no Nature lover who has not at some time longed to raise lilies. For many years, however, there has been a feeling among amateurs that the lilies are difficult to bring into bloom, and that they had best be left in the care of the professional gardener. This is a wrong impression. Lilies, like children, must be understood in order to be raised satisfactorily. They have their likes and dislikes, and their food must be selected with intelligence.

One of the hardest and most gorgeous of the lilies is the one known as *Lilium auratum*, or commonly termed the gold-banded lily of Japan. Growing to a height of four and a half feet, this stately flower queen captures the eye of all visitors in the garden. With as many as eight open flowers and five to seven buds, it surely deserves the prize for quantity of bloom per stalk.

As to color, the name gives one a clue. On a white ground, covered with dark red specks, each wavy petal is painted with a broad, uneven line of soft yellow which follows the center rib. The ends of the petals curl around against the reverse side, starting quite near the tip. In this way it differs from the well known tiger lily whose petals start to curl backwards almost at the base.

This variety of lily needs no special care after once set. But a little preparation should be made at the time of planting. In the first place, the bulbs should be put in the ground as soon as they arrive from Japan. This time can not be depended upon as one year they may come in early, and the next year late. And if the bulbs seem very dry, soak them a little while in water.

Select a location in the garden where the sun will strike the plant for a few hours in the morning rather

than the afternoon. This lily blooms in the summer, and as the afternoon sun is a little too hot for the delicate buds, the effect is likely to be disastrous.

Have You Tried it in Your Garden?
by Edna Betts Trask

After selecting the location, dig down to a depth of a foot, and lay in material for drainage. One of the reasons for failures among beginning gardeners is disregard for proper drainage. Fine gravel and sand make good drainage material, as do broken flower pots. Lilies, like many shade-loving plants, do not enjoy having their feet stand in water. And the only way to be sure that you will not make your lilies suffer such treatment is to make these arrangements before planting.

A little powdered sulphur sprinkled on the base of the bulb will tend to ward off rot or mildew, a precaution worth taking before planting. Now the bulb is ready to be set in the ground. For this particular variety of lily, allow eight inches of soil to cover. The reason for this deep planting is that roots develop at

the base and stem of the bulb, unlike the manner of development in many kinds of lilies.

It is always advisable to have plenty of leaf-mold in the soil which is used to cover the bulb. Lilies enjoy an acid soil, and the leaf-mold assists in keeping this acidity. Do not use lime or manure with lilies, they do not take kindly to it. A little bone-meal is a safer fertilizer to use.

If you have never tried to grow *Lilium auratum*, do so this fall. They are the loveliest of the bulbous flowers, and with proper winter treatment, should come up every year, as strong and vigorous as when first set out. Their delicate fragrance is something never to be forgotten, and their mammoth flowers and opening buds serve as excellent decorative material.



AMONG THE BEAUTIFUL LILIES
The gold-banded variety has a touch of the Orient in its dark red specks and soft yellows

Restoration of color illustrations to the pages of Nature Magazine will soon be accomplished. If it is possible to complete the preparation and printing of the first set for the June number they will appear in that issue. R. Bruce Horsfall is now at work exclusively in the production of originals in color to meet the strenuous public demand.

RAINBOWS on Wings



WHERE NATURE'S COLORS WENT
*The Massena trogon, one of the most brilliant
birds of the tropics*

The Massena Trogons of the Tropics

by Alfred O Gross

TO THOSE who know the tropics, other places on the face of the globe grow drab and flat in comparison. It is a rainbow land, with its thousand bright shades flashing kaleidoscopically from every side, with its myriad forms of bird and animal life, with its tangles of verdure choking out everything but lush-growing life. The birds, untold numbers of them, are perhaps more responsible than any other factor for the brilliance which sends lovers of the tropics back again and again. And among them, the little trogon accounts for much more than its share of lavish display. It is a veritable rainbow on wings.

Of the many gorgeous trogons indigenous to our own American tropics, the most striking, and incidentally, the most common in Central America, is the massena trogon, *Curucujus m. massena*. It is a handsome creature

about twelve inches in length marked with brilliant metallic green above and with bronzed green on the throat which changes abruptly to a gaudy geranium red on the breast and underparts. In striking contrast to these colors, the wing coverts are gray with fine markings of black and white. Even the bill of this bird, which the natives of Costa Rica call the "mountain parrot", is highly colored with salmon orange. These colors which are so striking and conspicuous fade into insignificance, however, when seen against the variegated lighting of a tropical background. Under such conditions the trogons are as difficult to see as the protectively colored goat-suckers such as *Nyctidromus*,

THE life of Alfred O Gross, now Professor of Biology and Ornithology at Bowdoin College, has been filled with conservation struggles and ornithological investigations in many parts of the world. With a degree from Illinois, he had worked as field ornithologist for the Illinois State Ornithological Survey and gone to Bermuda on a tropical bird study before obtaining further instruction at Harvard and the coveted Ph. D. In 1924, he was field bird-man for the Roosevelt Wild Life Experiment Station. The five-year heath hen investigation, which recently terminated with the sad announcement that but one of the species remained, was conducted under his leadership, as was the important New England ruffed grouse investigation. During the past summer, he was engaged in directing activities of the Wisconsin prairie chicken survey. The past few years have found him at Barro Colorado Island, Canal Zone, in Costa Rica for the United Fruit Company, in the lowlands of Ecuador and on the Andean plateau. And yet with all this travel and study, he still finds time to write articles of a popular nature.

the jungle whip-poor-will which lives in the same environment.

The massena trogon is a passive creature never meddling in the affairs of other birds of the jungle but attends strictly to its own business. Most of the trogons I have seen in Nature were noticed by mere accident while searching the dense foliage for other creatures. One day when walking on one of the trails of Barro Colorado Island,

Panama Canal Zone, where the massena trogon is common, I came upon a male bird perched on a limb overhanging the trail not more than fifteen feet above the ground. Though aware of my presence he allowed me to view his beautiful plumage from every angle, yet following me closely with his eye as I circled around him.

Though the trogons are extraordinary in their possession of brilliant colors they have but little musical talent.

The notes of the massena trogon are little more than a monotonous commonplace "Kaw, Kaw, Kaw", varied at times by a series of subdued whistled notes. The calls are more frequently heard during the early morning hours and are in less evidence as the light and heat of the tropical sun become more intense towards midday. It is also during the hours immediately following dawn that they are most active in their feeding operations. One of the most beautiful scenes of tropical bird life that I have ever seen was during an early morning in October when seven massena trogons and five graceful trogons, *Trogonurus curucui tenellus*, were dexterously balancing or suspending them-

selves with half spread wings from long-drooping vines hanging down from the limbs of a giant sand box tree. The sun was filtering through the jungle roof and beautifully illuminated the whole scene in such a way that the magnificent colors of the birds, the tropical foliage and the brilliant red fruits were shown up at their very best. Sometimes there was keen competition for a certain branch laden with an abundance of fruit, which usually resulted in a friendly tussle involving a vigorous flapping of wings that dislodged many fruits and sent them raining on the foliage below. Some of the birds flew frequently to the less accessible fruit clusters and without alighting poised on their wings to pick out the black seeds contained in the white interior of the opened fruits. After securing a beak full of the pulpy material they would generally fly to the nearest tree to feed in peace, but as soon as the seeds were eaten they were back at the vines for more. The food of all trogons examined consisted chiefly of fruits, berries, seeds and a few insects. Many of the latter were probably taken incidentally at the time the birds were eating fruits.

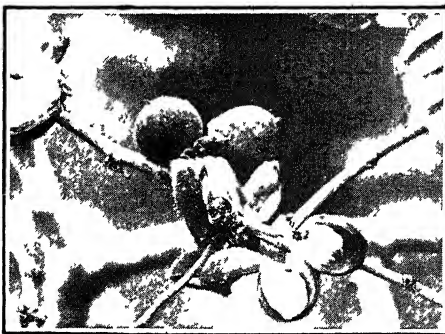
One might expect a beautiful bird such as the massena trogon to select a nesting site in an attractive environment, but contrary to such expectations we found the nest of this bird in a most unusual situation. Throughout the tropics there are a great many different kinds of insects of which the termites, the so-called white-ants, build large dark-colored nests of wood pulp and soil. The nests vary in size from a few inches to several feet in diameter, and are usually attached to large vines or constructed on or about trees. A deserted termite's nest of considerable size located around a group of small trees at a distance of twelve feet from the ground was selected by a pair of massena trogons as a nesting site. Whether the birds excavated their own nest cavity or not I was unable to determine as the eggs were already in place when the nest was found on June 28, 1927, near the Barro Colorado Island Laboratory. The entrance tunnel to the nest took an upward course of several inches, then turned abruptly down into a chamber approximately eight inches in diameter. No nesting material had been added, clearly indicating that these birds primarily nest in excavations of some sort. The two eggs were a very light bluish white without any markings, which has been found characteristic of a number of birds that follow this primitive method of nesting. The weights of the eggs were 12.5 and 12.2 grams, and the measurements were 35.2 x 27.1 millimeters and 33.5 x 27.0 millimeters,

respectively, roughly an inch and a third long.

The nest, though deserted by the termites was occupied by a host of small brown ants, which quickly covered my hands and arms when I reached in to remove the eggs for study. There were also a number of buzzing flies always in evidence about the entrance tunnel to the nest but I soon learned that neither the ants nor the flies could do any serious harm. It required all the courage I could muster, however, the first time I thrust my arm into that forbidding, gruesome looking nest cavity which in addition to the insects, was made repulsively wet and slimy by the frequent downpours of the rainy season. I

cannot image a less attractive site, for even the clay bank holes of the motmots are much more attractive. It is not known whether the termite nests afford the usual nesting site of these beautiful trogons, but it is noted that the little paroquets, *Biotoecus jugularis*, frequently use these curious structures as a place to lay their eggs and rear their young.

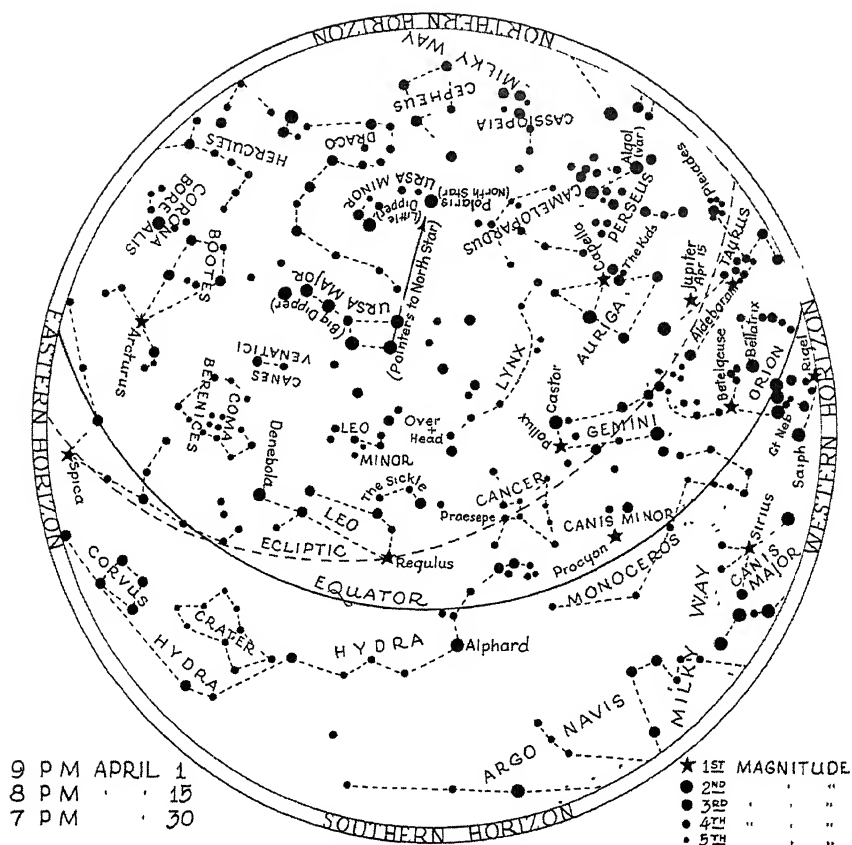
Both the male and female massena trogons took part in the incubation of the eggs and later in the feeding and care of the young. While the principal food of the adults consists of fruits and seeds, practically all of the food delivered to the young during the first few days consisted of winged insects which were torn to bits usually at the entrance of the nest. The adults were cautious and deliberate in returning to their young although at other times they seem quite fearless of man when approached in the



JUST FOUR DAYS OLD

Above are a pair of baby trogons with eyes not yet open. Below are the opened fruits of the sand box tree, their favorite food.

woods. When nearing the nest they kept up a continual "Kaw, Kaw" call in answer to the complaining notes uttered by the young in the nest. Invariably the birds carried the food in their bills and apparently most of it given to the young is delivered directly and not by a process of regurgitation. The young when hatched were naked, without a vestige of down. At the age of four days the papillae of the juvenal plumage began to appear along the principal feather tracts, especially in the region of the wings. Unfortunately the young we had found disappeared before the end of a week. Apparently they were taken by some prowling animal that broke into the nest. The large number of nests which are destroyed in the jungle, before the young reach maturity, is appalling. The struggle for existence is so intense that it is surprising that defenseless birds such as the trogons are able to survive as a species. But it is likely that the brilliant coloring becomes in the case of the trogons a protective device, rather than a detriment, due to its practical obliteration in the dappled shades of the jungle.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

TWO ECLIPSES IN APRIL

Sun and Moon to Hide this Month

by Isabel M. Lewis

APRIL will be an eventful month in the heavens. On April 13 the moon will go into a small, partial eclipse, visible to observers in the two Americas, on the Atlantic and Pacific Oceans, and in southwestern Europe and northwestern Africa. During this eclipse, however, only about eleven per cent of the moon's surface will be covered by the earth's shadow. It will commence at 12 20 A. M., E. S. T., reach its maximum at 12 58 and end at 1 35—one hour and fifteen minutes.

The more important event, however, will be the solar eclipse on April 28. As is often the case with important happenings, it will be a more exclusive affair and will be visible as a total eclipse only from a narrow strip of land about one half mile wide and several hundred miles long. This strip passes a little to the north of San Francisco and Sacramento, grazes the southern extremity of Honey Lake, crosses the Black Rock Desert and Kings

River Valley in Nevada, the extreme southeastern corner of Oregon, and goes thence diagonally across Idaho a few miles south of Silver City and Boise City. From there it crosses the Rocky Mountains into Montana, where the eclipse changes from total to annular.

Several scientific expeditions will endeavor, of course, to get within this narrow section of the country with scientific instruments. The astronomical importance of total eclipses of the sun is great, even when the duration is as momentary as it is in this exceptional case. In fact, this is the first total solar eclipse visible in this country since the eclipse of January 24, 1925, which was seen by several million people in New York and New England.

The coming eclipse is of that peculiar kind known as a central eclipse of total-annular type. In it the vertex of the moon's shadow-cone just barely grazes the surface of

the earth, falling slightly short of the surface at the portion of its path where the eclipse is annular, and lying just beneath the surface at the places where the eclipse is total.

In an annular eclipse of the sun there is a narrow annulus or ring of light seen surrounding the moon at the time of greatest eclipse. An eclipse of this type always occurs when the relative positions of earth, sun and moon are such that the moon's cone-shaped shadow falls short of the earth, at the time when the moon is passing between the earth and sun. In that case the apparent diameter of the moon's disk is smaller than that of the sun, and as a result the sun is not completely covered by the lunar disk.

The eclipse of April 28 will begin in the Pacific Ocean at sunrise and the moon's shadow will sweep rapidly across the earth in a north-easterly direction toward the coast of California. The eclipse will be annular over a very narrow path until it reaches a point near the coast in longitude 125 deg 29 min west of Greenwich and latitude 35 deg 28 min north. There it changes from annular to total. It continues as a total eclipse to a point in longitude 112 deg 23 min west and latitude 45 deg 40 min north where it changes from total back to annular. Although the eclipse will be annular for most of its course in Montana and in Canada, it will present a magnificent spectacle to those who are within the path of the annulus. The position 106 deg 14 min west longitude and 48 deg 54 min north latitude, is that of a point on the central line of the annulus near the boundary between the United States and Canada. The approximate path of the total-annular eclipse in the United States may be found by plotting and connecting with a straight line on an atlas of the United States the three positions which we have given. Another point on the central line of the annular eclipse is in Manitoba in longitude 100 deg 31 min west and 51 deg 13 min north latitude. The path of annular eclipse, after passing diagonally across Canada through Saskatchewan, Manitoba and Labrador, crossing Lake Winnipeg and Hudson Bay in its course, leaves the earth at sunset in the north Atlantic.

The most unusual feature of this eclipse from the astronomer's point of view is the fact that those who wish to make scientific observations of the eclipse may have difficulties in locating the exact position of the path of total eclipse since it is barely one-half mile wide and its position is uncertain by several times its width. This is due to the effect of the fluctuations in the moon's position which cannot be predicted accurately in advance by the theory of the motion of the moon. It is only through observations of the moon's position made shortly before the eclipse that the effect of these irregularities in the moon's position upon the eclipse path can be determined and the necessary corrections made as to the position of the path. Ordinarily, when the path is from sixty to one hundred miles or more in width, an error of a half a mile or so in its width is immaterial. In this case, however, a difference of half a mile in position means that either the scientific observer will see a total eclipse and be successful in making his scientific observations or he will be outside of the path, see a partial instead of total eclipse, and be unsuccessful

in his efforts. It is only the total phase of a solar eclipse that is of scientific value.

It has been said that the solar corona, that beautiful and mysterious outer envelope of the sun that changes continuously in form with sunspot frequency, may be seen only during the total phase of a solar eclipse. Observers of the total eclipse of January 24, 1925 noted however, that the solar corona was faintly visible about twenty seconds before the beginning of total eclipse, increasing in intensity continuously until the sun was completely covered by the moon and fading away gradually after totality. This was particularly noticeable at high elevations because of the lower density of the atmosphere. The observers of the coming eclipse who choose high altitudes for their sites of observations, and there will be many opportunities to do so since the path traverses an extremely mountainous region, should be rewarded by a view of the corona lasting for at least a quarter of a minute and possibly longer. The chromosphere, the rosy-tinged lower atmosphere of the sun in which originate the great solar prominences of hydrogen, helium and calcium rising frequently to heights of tens of thousands of miles above the solar surface, should be particularly conspicuous in the coming eclipse. This is because the diameter of the moon will be so slightly in excess of that of the sun that more than the average amount of the lower atmosphere of the sun will be visible.

Scientific observers are planning, on account of the uncertainty of the exact location of the half-mile wide eclipse path, to occupy several stations about a quarter of a mile apart in a line at right angles to the eclipse path. Otherwise the erratic moon might disappoint them with a partial instead of a total eclipse.

In California the total eclipse will occur about 11 A. M., P. T.; in Idaho about 12 15 P. M., M. T., and in Montana a few minutes later than in Idaho. In Berkeley, Sacramento and Boise City 99 per cent of the sun's diameter will be covered by the moon at greatest eclipse, in Carson City and Helena 97 per cent and 98 per cent respectively and in Butte about 99 per cent. There will be a very large partial eclipse in all the northwestern states, the magnitude decreasing with distance from the central line. In the Central States the maximum eclipse will occur near two o'clock and in the Eastern States about fifteen or twenty minutes after three o'clock. At Washington the eclipse will begin at 2 09 P. M., the greatest eclipse will occur at 3 23 P. M. and the eclipse will end at 4 30 P. M., E. S. T. The magnitude will be 49 per cent. It will be 54 per cent in New York, 58 per cent in Boston, 64 per cent in Chicago, 56 per cent in St. Louis, 30 per cent in New Orleans, 36 per cent in Atlanta. At the Lick Observatory on Mount Hamilton, Calif. the magnitude of the eclipse will be 97 per cent and at the Mt. Wilson Observatory near Pasadena, California, 85 per cent. An expedition will be sent to the path of total eclipse from the Lick Observatory, one of the long series of Crocker eclipse expeditions, which according to reports at the present time will locate at Oak Valley near Cramptonville, California. Other favorable sites in California are at Mohawk at an elevation of over 4,000 feet or at

(Continued on page 255)

FRIENDS OF MY SOLITUDE

By Shasta Leila Hoover

THE friends of my solitude out-number by far those of my social life. This may be because Nature and Art are more easily approached than persons. These friends are not sticklers for conventions, they never demand a formal introduction, they never accuse me of neglect or deceit, they never condescend to apologies. They are consistent in all they have ever said or done, they are constant, genial and sympathetic, pointing ever to the great Beyond toward which we are steadily moving. They give rest to the tired heart, they bring calm to the troubled soul.

My father came West when I was a small child and took up a homestead in the forests of the Northwest. Having no playmate other than an old bull dog, I was thrown on my own resources for entertainment. At an early age I learned that between myself and the things of Nature, there was a language. This language consisted of feeling rather than words. I also learned that in order to receive and communicate Nature messages, I must keep a clear conscience. After a bit of temper or wilful disobedience, I found myself shut out from companionship with the Spirit of the Forest, and it took days and sometimes weeks before I could again be established in my former state of enjoyment. I, therefore, came to be known as "a good child," not because I wanted to be good but because I wanted to keep my place and communion with Nature.

When I left the forest and entered school, Art opened the door to the treasures of the past. Books became a passion. I gathered them from every quarter, I spent all my extra money and some that was not extra for them. I spent every spare moment reading—while waiting in a store, while riding on a street car or when eating my breakfast, and many times when I should have been sleeping. Thus I made their acquaintance and found in them the delight and satisfaction second only to the joy I had found in Nature.

These Friends of my Solitude are not merely things, they are realities with souls. The walnut tree that stands by my window with graceful limbs and beautiful foliage, responsive to every breath of air, glowing in the morning sunshine, shivering in the evening shadow, is something more than a tree. It is a living, breathing, enduring reality. This book on my table is something more than the "embalmed mind" of a man who lived centuries ago. It is a great force, shaping the destiny of the world. These things are true magic, they are instinct with life, they have souls.

I come to my room after a long day's work. I close the door and am alone. The day has been a hard one, my friends have misunderstood me, my labors seem all in vain. I am glad, I tell myself, to be away from the thankless, unappreciative world of men. I am weary of it all, I want to forget it. Turning to my favorite author, I pick up the book and open it at random. I sit by the window with the open volume and look at my walnut tree in its regal beauty, glowing in the light of the setting sun. Gradually there enters my consciousness the presence of an understanding, a quieting

(Continued on page 255)

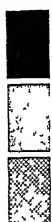


SEEDS CULTIVATION FERTILITY SOIL CONDITION

The foundation of all garden success is the condition of the soil

Soil condition is the most important element in a garden. Admittedly, flowers now grow in your garden; but no plant will produce its maximum beauty and luxury unless the *mechanical condition* of the soil is such that it gives decided stimulation to root development. It is *soil condition* more than fertilizer that stimulates root action.

Let's demonstrate.




We'll start with clay. Water runs off as it does from a duck's back. It becomes muck. No absorption, no aeration; no holding power for the precious water which plants must have in just the right volume. Clay is too tight and compact.

Take sand. Again no holding power, because of excess drainage. Water and food leach rapidly away, are wasted.

But if you mix sand and clay you would still lack the most important element—organic matter—humus. And most soil does lack this needed organic matter, which contributes the humus to soils. That is why so many plants fail to make satisfactory progress. Organic matter holds moisture, and moisture dissolves plant food, so that a properly conditioned soil acts as a reservoir for all of the food and moisture a plant needs to produce maximum results.

Commercial growers long ago discovered that Pioneer G P M Peat Moss is the best material for supplying this organic matter. They use it not only when soil is heavy, or loose and sandy, but also to replenish the available humus which must be kept in the soil at all times.

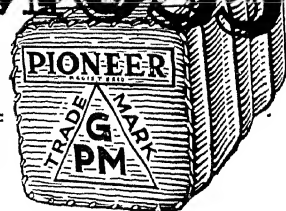
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THINGS to THINK ABOUT

Killing Our Eider Ducks

We note in a Maine paper that a prominent Bostonian, dealer in automobiles, has been fined \$2700 in Portland for having in his possession ninety eider ducks, killed in violation of the Migratory Bird Treaty Act.

These birds are protected at all times because of their value as producers of a fine quality of down, which is taken from the nest without interfering with the increase of the species. The female replaces the lining that has been purloined, and proceeds to raise her family as if nothing had happened. To the inhabitants of the Labrador Coast, who jealously guard the birds from harm, the eider is thus a source of income in a land where living is hard.

Besides the fact that the bird is of economic importance as a live bird, the eider is not a sporty duck, and the motive back of this act of vandalism is a mystery. It would seem that to some persons the opportunity to kill a bird whose taking is denied to law-abiding citizens is a temptation difficult to resist.

This incident, however, should serve as a warning to those who think they can violate a beneficent statute with impunity, that sentiment for the protection of our birds is becoming a vital force. When this feeling shall have become general a new era in wild life protection will be born.

Wanted—A Change

Not long ago the editor of a popular outdoor journal, a man nationally known as a conservationist, wrote an editorial on the value of game birds. In this he asserted that our game birds lack the esthetic value of birds such as the bluebird, but are desirable only because of the sport they furnish, and the value of their carcasses as food. Such an utterance is evidence that we need to emphasize a different point of view.

This man must be considered to represent the viewpoint of a great many, for he is the editor of a widely circulated sportsman's magazine. To such a one the sight of a wedge-shaped flock of wild geese, winging their pathless flight from their nesting grounds in the sub-arctic to their winter homes in the Gulf States, bringing to thousands, pent up in cities, a breath of the wild free air of the unspoiled wilderness, inspiring the poet to some of his finest fancies, is no more than a mess of meat shot on a baited pond. The woodcock, weaving through the evening sky his twittering circle as he serenades his mate, is only a few ounces of dark meat shot down before the pointing dog. The bobwhite, whistling his cheery call to his mate in the stubble, represents to such a soul only a plump-breasted morsel checked in his rapid flight by a charge of shot.

How long will we be content to leave in the hands of such men the fate of some of the finest of our birds?

A Page Devoted to Conservation from Varying Angles

BILLBOARD SURVEY

For the past two months Mrs W L Lawton of the National Council for Protection of Roadside Beauty has been conducting an intensive demonstration survey of the billboard and highway beautification situation in North Carolina. This survey has been made through means provided by the American Nature Association and in cooperation with our Association. The results will shortly be published in a report, copies of which may be had, when available, by sending your request to the Editor, Nature Magazine, 1214 16th Street, Washington, D C

The Plight of Ruffed Grouse

Now when most of its habitat is blanketed in snow, we wonder how fares the ruffed grouse. Not that we fear for those that have survived the hunting season—for no bird in the world is better equipped to care for itself in winter than this beautiful species. It grows snowshoes in the fall, it roosts on branches of trees, or beneath the snow itself, its food consists of leaves, and fruit and buds, many of which can not be buried, so it is seldom at a loss. Removal of the original forest cover is a benefit rather than an injury, for this brings an increase in the plants that furnish its food. But with the removal of the forest have come more people, with more and better guns, and quicker means of transportation, and its former teeming numbers have been brought low.

The present season has seen additional safeguards thrown around this splendid bird. The hunting restrictions have not arisen from any mere desire to help this species, but through fear that it disappear altogether from its once populous haunts. Even those responsible for its scarcity are alarmed at the pitiful remnant. These are the states that do not legalize its capture at any time: Alabama, Connecticut, Georgia, Illinois, Iowa, Kansas, Massachusetts, Minnesota, Mississippi, Missouri, New York, North Carolina, Ohio, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont and Wisconsin.

Here, even its enemies fear for its life. Mark these states on the map that shows the range of this once abundant bird, and see how low the gun has brought it.

But why should we worry, when so many states have granted protection to the grouse? This is the answer. Because each state is watching for the smallest increase that will afford an excuse to turn loose again on the bird its thousands of guns, and their allies, the trained dogs.

A Bird Lovers' League

This is an association that is designed to help all birds. Why should it not include all harmless animals also?

The league has already more than 20,000 members, scattered all over the British Isles, Canada, the United States, South America, South Africa, Australia and New Zealand, France, Switzerland, Germany and many other countries. It seeks members throughout the whole world. The Prince of Wales is a member. Everything is honorary. Anybody can join, it does not cost anything to become a member, and each member is sent a small badge when enrolled. Its motto is:

"He liveth best who loveth best."

All things both great and small."

The rules, slightly modified the better to suit conditions in the United States, follow:

1 Not to kill any wild bird, nor take any eggs or nests, and to try to prevent others from doing so. Permits can be obtained by farmers and others who have to keep down harmful birds.

2 Not to catch or keep in a cage any wild bird, and to try to prevent others from doing so.

3 To put out food and water for birds in frosty weather and water in hot weather.

4 Not to buy or wear any feathers (except ostrich and poultry), and to try to prevent others from doing so.

5 Not to burn, or destroy in any way, trees or bushes, and to try to prevent others from doing so.

6 To try to get more members for Bird Lovers' League.

Joint Presidents: M M Benson, S V Benson. Address: Bishops Hill, Polzeath, Wadebridge, Cornwall, England.

Flappers and Furs

Miss Ima Dumbunny, winner of the beauty contest held by the Silver Rabbits Association, says that, as far as she can see, even if an animal has suffered a few days in a trap, it can do no harm to wear its skin now that it is dead, and anyway, her furrier, Mr Izzie Skingame, says it will be only too easy to give her a guarantee that any fur he sells was killed humanely, and besides, she thinks any animal ought to be glad to suffer a while with the prospect of adorning her neck, for it makes her look perfectly lovely, and she don't see how it makes any difference if furs are a little warm in summer, when you can get such lovely cool drinks at any soda fountain, and suppose leopard coats are made out of stencilled rabbit skins, what is the difference if you can get away with it, and besides, if it wasn't for the fur-trade, the foxes would eat up all the rabbits, or the rabbits would eat up all the foxes, she has forgotten which.

power, a unifying influence I have read nothing in my book, I have said nothing to my tree, but the soul of my book rises up to comfort me and the presence of my tree bids all weariness be gone. As from a vision, I arise with new strength and new determination. I am myself again, in harmony with my work and my fellow-workers. There is no misunderstanding, everything is right. I will do better work tomorrow, I will prove myself a better friend.

What has brought about the change? What has banished the darkness and restored the light? The Friends of my Solitude have spoken and my Soul has heard their voice.

TWO ECLIPSES IN APRIL

(Continued from page 252)

Honey Lake. There will undoubtedly be, also, many automobiles parked along the trail of the moon's shadow in Northern California, Nevada, Idaho and Montana on the eventful morning of April 28 when the sun and moon play hide and seek.

Among the planets this month Venus will be visible low in the west at sunset. Jupiter is also in the western evening sky in Taurus. Mercury is at its greatest eastern elongation on April 27. It should be visible for about a week before and after this date in the northwestern sky after sunset. This is one of Mercury's favorable elongations and it should not be a difficult matter to find it in the evening twilight at the time mentioned. It is very similar to Vega in appearance at that time.

Saturn is now in the eastern morning sky and will be seen due south at sunrise on April 2. Mars enters the constellation of Pisces this month and may be found in the southeast shortly before sunrise.

The Big Dipper is now approaching the meridian above the pole and The Sickle in Leo is due south at 9:00 p. m. Orion is disappearing below the southwestern horizon and Taurus, Gemini and Auriga and the two Dog Stars, Sirius and Procyon, still linger in the west. Hydra, The Water-snake, with its riders, stretches across the Southern sky.

State Park Meeting

Those interested in various phases of the development of State Parks are looking forward to the tenth annual meeting of the National Conference on State Parks. It will be held this year at Linville, North Carolina, from June 17 to 20, according to the dates tentatively set. In order that the meeting may offer greater value to men and women in the park, forest and game administrative field, separate programs of a more professional type are being planned for this group for at least two evenings of the three which will be spent at Linville. In addition, one morning or afternoon session is to be set aside entirely for informal discussion without any set speeches. This will probably be held on next to the last day, and will afford a valuable opportunity for the people from the Southern States, many of whom are expected to be present to ask questions and acquire information of special value to them.

"Consider the Lilies"



Lilium auratum



Lilium regale

HARDY LILIES, planted among other plants in the Hardy Border help to glorify it and maintain a colorful display from early summer until Fall. They are friendly creatures, almost human in their appeal to the senses of mankind, creating surroundings in which he may live a better life in a more beautiful world. They are always among the first choice of professional gardeners and enthusiastic amateurs, and it is their enthusiasm and support that has encouraged us in our work of the past 10 years in seeking the lost or unknown Lilies that are indigenous to unexplored regions of the Orient.

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will bloom from June until September

3 *Lilium Auratum* 3 *Lilium Elegans* 3 *Lilium Tigrinum*
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15 bulbs in all, list value \$7.20. Sent prepaid with our Lily Book for \$6.00 (A total value of \$8.20 for \$6.00)

THE STately REGAL Lily For those who cannot use the above entire collection, we suggest the Regal Lily (*Lilium Regale*) as a most desirable and extremely hardy garden variety, fragrant white flowers, brownish outside.

3 Flowering bulbs for \$1.20 or 6 for \$2.00 postpaid.

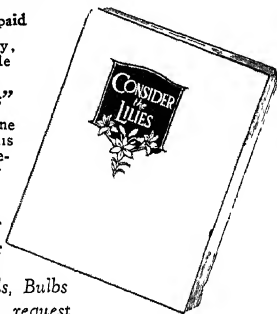
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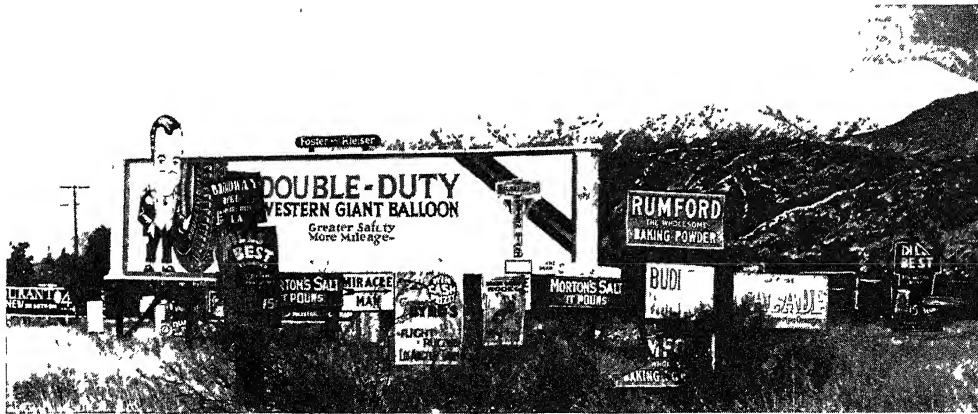


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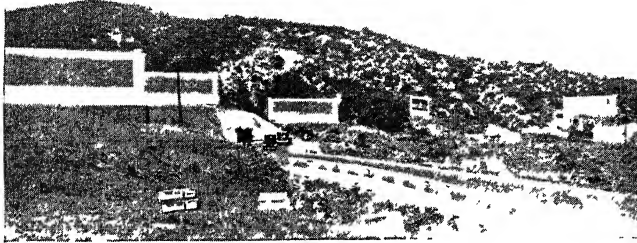
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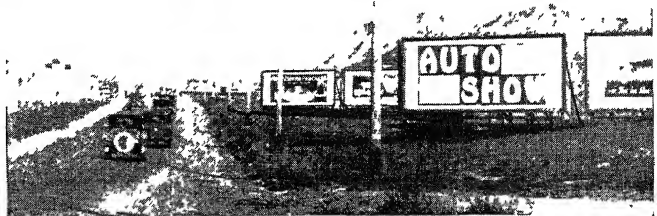
OUR recent article on the billboard problem in California brought various comment, the great bulk of it commendatory and appreciative of our having stated the case. We do not wish to seem to

of our beautiful west coast state are recognizing the tremendous value which lies in their scenery and are moving to reclaim it. Under the aegis of the California Development Association a system of scenic



At the top of the page we have a "view" of the snow-clad Sierra Madres from the famous Foothill Boulevard near Pasadena. Behind this atrocity and at the right is noted Mount Wilson. At the left stand several blank boards showing how the yeast of public sentiment has begun to work and how advertisers are recognizing the revolution of feeling. This is on the Foothill Boulevard between Eagle Rock and Pasadena.

At the right is a picture of the gauntlet of billboards that motorists must run on Huntington Drive between Los Angeles and Pasadena. At the bottom of the page is a scene along El Camino Real between Los Angeles and Ventura. The billboard interests contend that no landscape beauty can be ruined here because this is a commercial highway used by trucks. It happens also to be the main highway for pleasure and tourist traffic.



"pick on" California because the blight is certainly not limited to that State. In fact, our object is to lend fuel to the rapidly rising flame of public sentiment that is declaring itself in California and elsewhere. The people

reserves, or protected highways, is being built up. This movement is helping greatly, but the pictures on this page, taken by John Edwin Hogg, show what kind of a problem it is and what sort of work is to be done.





PLANTING THE GARDEN, MONTH BY MONTH

By Romaine B Ware

April is one of the important planting months of the garden year. New beds and borders can be planted this month, as many perennials can be handled soon after the frost leaves the ground. Preparations can be made for the annuals to be set out later and for seed beds where seeds may be started when the soil dries out and warms up a bit. Don't be in a hurry to plant seeds outdoors because if the weather is cold and wet they may rot rather than grow.

Hot beds and cold frames are most valuable at this season because with them growing conditions such as temperature and moisture are more easily regulated. If your garden time is limited to early mornings and late evenings together with week ends, you may find a cold frame more practical than a hot bed. A hot bed with the possibilities of excessive heat, requires more exacting attention than a cold frame. The latter can not be started as early but is much easier to manage.

This is the season for planting roses in many sections of the country and there are many little details that may well be considered. Roses are among the most important of all garden flowers, everybody loves them and wants to grow them but it seems that not everyone is interested to the extent of learning the best methods of handling them. Of the hundreds of thousands of roses planted each year, but a small share of them are so handled that they may do their best.

First they are best cared for in beds rather than among other things and they should never be planted in holes cut in the lawn as we see so many all over the country. In separate beds or even in separate gardens, they may not only be cared for the easiest but they will make the best show. As for location, roses need full sunlight at least two-thirds of the day and shelter from severe winds though there should be some circulation of air. They will not thrive where they must fight with the roots of trees and shrubs in the soil and above all they must have good drainage. This may sound as if they are extremely particular as to their location but the above requirements are not difficult to meet.

Experience has shown that a clay soil is best for roses, a medium clay soil, known as a "clay loam", is ideal. Clay is rich in plant food but is difficult to work, generally lacking in humus. When preparing soil for roses it may virtually be made to order, adding clay and humus to light soils or sand and humus to heavy soils. Humus is most important as it not only aids light soils in retaining moisture but helps heavy soils to drain properly and by aerating the soil, increases bacterial action so necessary for the liberation of plant food. Straw

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ROSES—Spring Planting

Several hundred thousand, two-year-old, low-budded, field-grown plants, in several hundred varieties, are ready for shipment. Many are new and rare, among them are Mrs. C. A. VanRossem, President Herbert Hoover, Lady Margaret Stewart, Etoile de Hollande a favorite variety, Everest the largest white rose, Thelma a new and dainty pink Climber, and Arrilaga, a wonderful Hybrid Perpetual Standard or Tree. Roses are strongly represented in our fields. We grow Roses adapted to all parts of the country.

In your request for Catalog, it is important to state definitely what you intend to plant. You will confer a favor upon us by mentioning this magazine when writing.

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ROSES by Bobbink & Atkins

The 1930 edition is replete with up-to-date varieties—it is more than a Catalog, it is a reference and guide for American Rose Amateur and Growers, it presents late introductions which offer new surprises, and includes many favorites of olden days. Many are illustrated in color, correct descriptions are given with comments on their merits and demerits, cultivation instructions are simplified, all are classified and arranged to make ordering easy, pen and ink sketches show planting stens and how to secure the most perfect flowers. A copy will be mailed on request to those who intend to plant Roses.

OUR SPECIALTIES

Lilacs, Azalea Mollis and Pontica, Chinese Magnolias, Cotoneasters, Japanese Maples and Weeping Flowering Cherries, Blue Spruce, Grafted Koster and Moerheim varieties, Red Dogwood. We shall be glad to give you prices.



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Etoile de France Garnet red.
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- 1 pkt Schling's Giant Salmon Pink Zinnia Most pleasing of colors 25
- 1 pkt Dimorphotheca, Ecklonis East African Daisy pure white with diminutive deep blue discs on 18 inch stems 50

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manure thoroughly incorporated with the soil not only supplies food but adds humus as well Soils that have been cropped and recropped without liberal additions of natural fertilizers generally lack humus but this deficiency is easily remedied by adding leaf mold, commercial humus or granulated peat moss

No small measure of the success with roses depends upon the actual planting If this is done carelessly the plant can not be expected to thrive In well prepared soil, made reasonably fine, dig a hole large enough and deep enough to spread the roots naturally If the roots can be so arranged, spread them over a mound or cone of soil built up in the hole and work fine soil in all around them Make sure there are no air pockets and as you fill in the hole get in it with your feet and tramp the soil solidly This should not be done if the soil is wet, in fact it is difficult to do a good job of planting if the ground is very wet When the planting is complete have the surface of the bed level and keep it level, never hilling up around the plants as is seen in so many gardens

When preparing the bush for planting, cut off any decayed, broken or bruised roots and shorten any extra long ones so that they will go in the hole without crowding Make clean cuts so that they will heal promptly Prune back the branches to within six inches or less of the ground Don't be afraid to cut them as all the bloom is produced upon the new wood grown this season The more severely they are pruned the better the quality of flowers This rule as to pruning does not apply to climbers as they produce their bloom upon the wood of the previous season's growth Always prune them just after flowering Climbers when planted should be cut back to within about twelve inches of the ground

At planting time be careful not to expose the roots to the air and wind even for a few moments The tiny hair-like roots are so easily killed if not protected Keep them covered with wet burlap or moss They might even be carried around the garden in a pail of liquid mud Sometimes one receives bushes that for some reason or other have been allowed to dry out till they are all shriveled up If planted in that condition, there is little chance of their surviving The best method is to bury the bush a few inches deep right out in the garden The whole plant should be under ground and at the end of ten days when they are dug up they will be found to be plump and green, ready for planting Do not bury them for this purpose in bundles but each bush separately Many a valuable plant has been saved this way that otherwise could not have been brought through

Care should be used to set the plants at the proper depth The "bud" should be just below the surface of the soil Too deep or too shallow planting results in poor growth and few flowers See that they do not settle after planting by checking up on them a few weeks later

The care of roses is another story and can not be included here but they will not thrive if neglected Cultivation, feeding, watering and especially dusting and spraying must be attended to regularly Have the necessary supplies and equipment on hand before they are needed and use them in time Preparedness must be your motto

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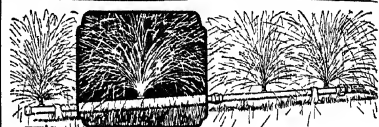
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and timeliness your watchword Frequently a matter of a day or two in the application of a spray will more than double the damage and increase the task many fold

Selection of varieties will be entirely according to one's taste Too, it will depend somewhat upon the kind of a garden one desires There are the very popular, ever-blooming, hybrid teas, (H T's) that make up the bulk of all rose gardens today and the older and more vigorous growing hybrid perpetuals, (H P's), blooming profusely in June but hardly at all at other times The H P's are by far the hardest of these two classes but with care the H T's can be wintered except in the most severe sections Many other classes and types are available but are not as well known as their excellent qualities warrant Among them we find trailing and creeping forms, invaluable for the wild and semi-wild garden There are also many varieties more like shrubs than the H T's and H P's and they should not be planted with them They have a distinctive place in many gardens where the owner would have something different You will find them worth study both in the catalogues and in the fields of the growers If you ever visit the wonderful plantings at the Arnold Arboretum, Boston, Mass., you will find their collection of these shrub or specie roses, as they are called, most interesting Specie roses have been collected from all over the world and present many interesting types, practically all of which are available for planting in our gardens if we only knew about them

The study and cultivation of the rose can become a most engrossing hobby It is not an avocation for lazy man but once you glimpse beyond the curtain of the ordinary rose planting and learn the possibilities of rose culture, you will find yourself upon the threshold of a world of beauty A Persian poet of unknown name sings

"Learn ye, O seekers, Wisdom's self reposes Close by, in yonder burning bush of Roses, Whence if your ears be open, ye may hear God speak to you, as once he spake to Moses"

Grayling Disappear

The last of the famous Michigan Grayling, of which E A Hyer wrote in the September, 1929 issue of Nature Magazine, have disappeared from the lower peninsula of Michigan and but a few remain in the Otter River in the upper peninsula, the State Department of Conservation reports The last resource of fish propagation—the transplanting of 130 from the Otter River to the Gladwin Game Refuge on the Tittabawassee River—has failed, the fish have dwindled, and at last, admitting defeat, the Department has removed the screen segregating the experiment Why the grayling, whose game qualities made him famous among anglers throughout the nation, should have disappeared, when once he choked Michigan streams, is a mystery Perhaps the cutting of the pine forests, perhaps the advent of brook trout, which preyed on his young, caused his demise The over-fishing of a generation or two ago of course contributed Whatever the cause, the grayling has joined the passenger pigeon as a legendary figure in the lower peninsula of Michigan.

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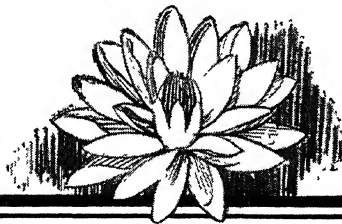
Small Pool Collection, \$10

Includes 3 Water Lily Plants, pink, blue and yellow, 20 Aquatic Plants in 10 varieties, 12 Goldfishes, 2 Catfishes, As sortment of Jap Snails, Tadpoles, etc., 1 Carton of Praefecta, our new fertilizer. All for \$10.

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Shows you how to construct a pool or plant a tub garden. Describes our immense collection of Water Lilies and Aquatic plants. Many illustrated in natural colors. Gives cultural directions. Write for Free copy.

Collection of hardy fishes. Pair each of Chaetodon, Cardinal Fish, Pearl Roach, Black Bullheads, 2 Jap Snails; \$5.50. 2 Coral Snails.



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Winter in Glacier

A severe winter in the northern Rockies again took its annual toll of the wild life in Glacier National Park, according to a report from J. R. Eakin, superintendent of the Park. There is no cause for alarm, however, he points out, because with one exception this is merely Nature's way of keeping the various species viable and vigorous and restricting the animal population so it will not exceed the food supply. The "survival of the fittest" insures there shall be no weaklings carried over into the breeding season to lower the virility of the denizens of the wilderness.

The one exception is peculiar to Glacier National Park. The Great Northern Railway skirts the southern boundary of the Park and near the area of the greatest concentration of deer. Some deer desert the feed yards, to go outside the park and walk on the railroad track to escape the deep snow. More than thirty have been killed by trains and nothing can be done about it. Despite this handicap, deer are showing a gratifying increase.

Nature's ways of preventing too rapid increase in wild life are losses from predatory animals, breaking through air holes on frozen lakes and rivers, snowslides and "winter kill." An animal not sufficiently vigorous to rustle for food dies of cold and starvation. This is called winter kill. It is Nature's trump card to prevent the breeding of inferior animals.

Coyotes were not numerous in the Park this winter. Signs of only one mountain lion were discovered by rangers on patrol and no evidence of wolves was observed. Probably several reported coyote kills were really winter kills upon which coyotes have been feeding.

Contrary to the usual belief snowslides are destructive to moose, elk, mountain goats and bighorn sheep. Several years ago one snowslide destroyed four elk. Last winter another slide killed two moose. Deer usually drift to the lower valleys and escape this menace.

Once in a blue moon moose bog down in lily ponds, their favorite feeding places, and cannot escape. A very few animals run against sharp sticks and are so badly torn they die. Deer and elk may become frightened and jump over precipices. However, losses from such causes are rare.

Flying the Grand Canyon

Amid the growing herd of deer peacefully grazing on the South Rim of the Grand Canyon, there are eight deer who have experienced a sensation like no other members of their family ever felt before—and doubtless they have told all about it. These eight were the first deer, so far as known, to be transported by airplane, and they were brought from the Kaibab country, where the range is insufficient, to better feeding grounds. Formerly deer were transported by truck along a road which necessitated 30 hours of travelling. Their expedition lasted but three hours. The Kaibab, incidentally, illustrates the effect of destroying the balance of Nature by killing off too many predatory animals. While conditions are improving, several years ago the deer population increased to such an extent that there was wholesale starvation, and in some places all the vegetation was stripped from the trees as far as a deer could reach.

Bugs need not ruin your beautiful plants, flowers, shrubs and evergreens. Destroy them through the use of Wilson's O. K. Plant Spray . . . the nationally recognized standard insecticide. Wilson's O. K. Plant Spray is non-poisonous, easily applied and is equally effective in-doors or out-of-doors. Recommended by the Officers of The Garden Club of America. Half-pint 40c, Quart \$1.00; Gallon \$3.00, 5 Gallons \$12.00; 10 Gallons \$20.00.

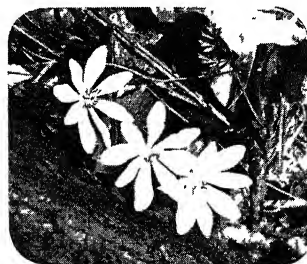


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One Black Crow

Oliver Sheppard of Penn Yan, New York, sends us an interesting clipping from the local newspaper, printed under the caption 'One Black Crow.' It says:

One black crow makes more fun than the Two Black Crows ever created for the residents in the southeastern section of Penn Yan. Jimmie, a tame crow belonging to Gladys Braisted, sister of Mr and Mrs Howard Braisted of Garfield avenue, entertains the neighborhood every morning while playing with two puppies.

"Daily the bird will fly to the home of Buster Borst and the home of Claudia Wheeler on Lincoln avenue to romp with their pet puppies, biting their ears, legs and tails with its beak as the dogs run up and down the street, the crow flapping over their heads. The neighbors enjoyed an especially hearty laugh the other morning when the black crow hung onto the tail of a very much veiled white puppy. Again the bird flew higher into the air to drop with a sudden swoop onto the nose of the black pup. The crow extracts pay for the amusement he affords the neighborhood by pulling the clothes pins off from the wires and letting the wind blow clean clothes onto the ground.

'A year ago last fall the bird was found wounded when the Braisted family was camping on the Ross Huson place near Dresden on Seneca Lake. It has been a family pet since that time and has acquired quite a repertoire of tricks."

To Reproduce Antiquity

Dinosaurs, mammoths and mastodons may be tethered along the lines of the Canadian National Railways in western Canada for the delight of American tourists. Those who pass by, however, need have no fear, for each dinosaur on a mountainside, each mammoth on the plains, each mastodon in a river bed will only be a likeness of the pre-historic beast encased in concrete. The plan is part of that undertaken by the National Museum as a monument to the wild life which roamed through western Canada millions of years ago. It is pointed out that the American Museum of Natural History, New York, has made plaster of Paris casts of some of the skeletons of pre-historic monsters. The Canadian Museum plans to have these figures constructed in concrete to last out the weather and to become as permanent parts of the countryside as the concrete abutments of bridges. A further announcement regarding the founding of a Canadian outdoor museum of natural history is expected shortly.

Arbor Day Change

In view of various circumstances the State Commission of Forestry of Alabama has recommended to the Governor a change in the day of Arbor Day from the first Friday in March to some date in the fall. It is pointed out that trees can as well be planted in the fall in that state and that the spring finds the commission occupied with forest fire protection work and unable to lend all the aid to the tree planting program that it would like. Women's clubs and other organizations join in the suggestion of a change in date.



The Ferns of New England

So common to those of us who live with them and so wonderful to those who behold them for the first time. Giant Ostrich Plumes by the river, Osmundas with their artistic fiddleheads, Maidenhair, seemingly fragile, but extremely hardy, Royal, lord of the swamps and meadows, Hayscented Fern wafting its fragrance through the autumn air, tiny Spleenworts and Polypodys clinging to rocks where such a feat seems impossible. These are a few of New England's ferns.

Ostrich Fern: *Pteritis nodulosa*. In full sun or partial shade, this native of the northern river banks and hollows may reach a height of six feet. Its size does not make it less graceful.

Maidenhair: *Adiantum pedatum*. In pockets of leafmold among the rocks, the Maidenhair Fern is most at home. It prefers shade.

Royal Fern: *Osmunda regalis*. Tall branching fronds of vigorous habit. Best in moist ground with partial shade, but grows almost anywhere.

Cinnamon Fern: *Osmunda Cinnamomea*. Rich open land or the woodland border is agreeable to this fern which grows four feet tall with wide spreading fronds.

Polypody: *Polypodium vulgare*. A miniature evergreen rock fern growing only 6 inches high. Needs shade.

Hayscented Fern: *Dennstedtia punctilobula*. Fragrant, graceful fronds a foot tall grows in mats in sun or partial shade.

Special Offer:

In spite of their loveliness and seeming fragility, most ferns are easily grown and we will send you a dozen each of the above six varieties, (72 ferns in all) for only \$10.00, or six of each variety for \$5.50.

Please send for our 1930 catalog. It lists a fine assortment of native trees, shrubs, ferns and plants and also plants with foreign accents such as Jap Anemones, Daphnes, French Lilacs, Hawthorns and Lilies, and evergreens, fruit trees, berry plants and asparagus, too.

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Trentonian, amber and bronze	75
Sanhican's Peach, peach cheek color	3.00
Sanhican's Gold, pale orange yellow	1.50
Roman Eagle, burnished copper	1.50
Margaret Woodrow Wilson, opalescent pink	1.50
Total List Value	\$8.25

Here is an \$8.25 present-day value (varieties that only a few years ago cost \$7.00 to \$10.00 each). Price great Prize Winning Dahlias for \$6.00

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"HELEN IVINS" "EDNA FERBER"
"GROVER WHALEN"

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Dealers and Salesmen MARCUS, IOWA

Rhode Island Active

"The worm has actually turned", declares Mrs. Walter B. Pearce, Chairman of the Department of Fine Arts of the Rhode Island State Federation of Women's Clubs. By this she means that those who have been subjected increasingly to the various forms of uglification of the Rhode Island landscape—billboards, hot dog stands, unsightly signs and the like—have begun to revolt. An active campaign has been going on in the State under the auspices of the Federation. Meetings devoted to beautification have been held widely and attended fully. The main concentration has been toward the arousing of public sentiment. Men and women are signing pledges to patronize those advertisers who keep their signs off the rural billboards. A Rhode Island Committee for the Protection of Roadside Beauty is active. Several advertisers, when approached, have gladly cooperated by the removal of their signs. Others have expressed hearty sympathy but are confronted with the advertising of their competitors and are loath to make a sacrifice at present. Among the best organized of the States, however, Rhode Island is accomplishing many things which should be a help to others as example.

Woodchuck Movie

"The Eastern Woodchuck and Its Control" is the title of a two-reel motion picture just released by the United States Department of Agriculture. It shows the nature of the damage done by woodchucks, or groundhogs, to alfalfa fields, fruit trees, and garden crops, and also the various methods of control that have been worked out by the Bureau of Biological Survey, including the use of calcium cyanide and of carbon disulphide. Formerly many farm boys hunted this rodent so persistently for sport or for the bounty paid that hardly a one was alive to look for his shadow on "groundhog day," but now they seem to have forsaken the gun for the automobile and its opportunities for recreation and enjoyment, to the neglect of the woodchuck. At any rate, the woodchuck has increased in numbers so rapidly in recent years that it has actually become a menace to cultivated crops in many of the northeastern States. The new picture is of special interest to farmers and may be borrowed without charge from the Office of Motion Pictures, United States Department of Agriculture, Washington, D. C. The borrower is required to pay transportation charges both ways.

Enlarged Elk Range

An enlarged winter elk range in Jackson Hole, south of Yellowstone National Park, to be made by purchasing private ranches, is the principal key to the promotion of health of the famous elk herd, according to O. J. Murie of the U. S. Biological Survey, who has spent more than two years studying the herd. Crowding around the government feeding stations makes it easy for disease to spread, and if the government does not feed the elk, they raid the haystacks of the valley farmers. If the range lands can be acquired for elk feeding grounds, the animals can be left to themselves late into the year, and will be less susceptible to disease.

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TOP GRADE
GLAD BULBS
only \$1**

**1 Dozen
Hardy Lilies
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Glad—Such beautiful varieties as America, Francis King, Alice Tinsley, Maiden Blush, Marshall Ford, Peace, etc. Elegant in borders or large beds. Fine for cut flowers.

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Peonies—Most popular of spring flowers—usually large size, standard 3 to 6 eye divisions.

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Make your lawn better this year with our quality, lush green lawn grass seed. Produces an enduring velvety turf comprised of the finest varieties of grasses.

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Money saving offers for quality nursery stock, bulbs and perennial plants. Free directory from grower. Order direct from this ad. No order for less than \$3.00.

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ALL PRICES CARRIAGE COLLECT

MONEY-BACK GUARANTEE
The original Hen-Money guarantee: Money cheerfully refunded without question if you are dissatisfied with your purchase.

**100
EVERGREEN
TREES \$3.50**
Buy From Grower
At Wholesale



Beautify your home with these vigorous hardy trees, four years, transplanted and well rooted. Average height 4-8 inches. Stated in severe Northern climate, they will thrive anywhere and grow rapidly.

**NORWAY SPRUCE SCOTCH PINE
WHITE SPRUCE NORWAY PINE**
100 of any variety or 25 of each kind \$3.50

Because of the late Northern spring, these trees are dormant until May, and can be planted with success in any climate. Order now for Delivery about May 1. No shipment of less than 100. Average weight 10 lbs. per hundred. Remit with order.

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Dept. C-1 FRYEBURG, MAINE
Send for Descriptive folder

Blooming Size CACTI



Group of 25 named varieties for sun room, porch or garden—If ordered individually would cost \$14—a quality bar—\$7. gain buy at 10 different named varieties with hand painted Mexican bowl \$4. Same without the bowl \$3. 5 different blooming size named varieties with Mexican \$2.50 bowl. Same without the bowl \$1.50. Cash culture book free with orders. Shipments prepaid. Send check or money order.

MEXICAN TRADING CO., Room E
Two Republican Bldg El Paso, Tex

A Squirrel Scout

If there is any more ardent Nature lover in the South than J. C. Sellers of the *Farm and Live Stock Record* of Jacksonville, Florida, we haven't met him. In a recent issue of his paper, J. C. (who does radio broadcast, too) says:

"The *Record* broadcaster, every morning that he is at his home, which is quite regularly, has breakfast with birds and squirrels, providing exclusively for them with cracked corn, such as commonly is fed to chickens. And how they like it, generally waiting for the appearance of the host with the can of corn. Sometimes, Mr. or Mrs. or Miss Squirrel grows impatient, if the host is late in arising from his night's repose, and comes up on the porch roof outside the latter's bedroom window, and, in perfect and vigorously expressed squirrel language, urges the bringing of his or her breakfast. And when, ultimately, it is served, how he or she 'wades in,' taking time only for giving looks of appreciation, to tell how good the corn is and how it is liked. There are a dozen of these squirrel friends that have their daily breakfast with this particular host, but only one at a time is sent to call the host from the observation point, which is the coping of the porch roof or the limb of a nearby tree."

Winter—A Musician

That Nature has a musical urge seems to be proved by an interesting experience reported by Amy Bischoff of Fort Wayne, Indiana. She writes:

"During the recent storm, while working at my desk, I became conscious of some very clear dainty, sweet music. My first thought was 'radio in the distance' but at the same time I could not think of an instrument that would produce such sounds and besides the music came from the window. My next thought was 'hail or sleet on the window pane' and again at the same moment I realized that sleet on a pane could hardly produce such a range of notes, for there were very high, clear, as well as low full tones. Upon walking to the window the mystery was solved. Father Winter had hung a row of icicles on the window sash—icicles of all sizes and length—and now he was pelting them with sleet and hail, producing this sweet clear music."

Society a Centenarian

One hundred years ago the ninth of February the Boston Society of Natural History was born, a pioneer in natural science in America. Its first meeting was held at the home of Dr. Walter Channing. Among the names introduced at that gathering was that of Thomas Nuttall, who became the first president, and down through the century of its existence its membership roll has included names eminent in American natural history, education and culture. The centenary of the formation of the Society passed without observances, these having been postponed until June 3, which is the anniversary of the dedication of the Museum's building, when appropriate ceremonies will be held.

Use Invisible Rose Spray

BIGGER BLOOMS, more vigorous foliage result from roses sprayed with Fungtrogen. This modern, invisible plant stimulant acts like magic on sick rose bushes.

Wind and insects spread the spores of Mildew and Black Spot—the two worst enemies of the rose. The invisible Fungtrogen spray soon checks these diseases. Does not discolor leaves.

Easy and pleasant to use. Simply mix with water and spray. Economical! Half pint makes 15 quarts of spray. Leading horticulturists enthusiastically

endorse it. Prepaid: half pint \$1, pint \$1.50. At your dealer's or send check.

Use "Fungtrogen" rose treatment. When insects appear on roses use APHISTROGEN, kills aphids—plant lice, and INSECTROGEN, kills leaf-eating insects. These sprays are chemically harmonious with FUNGTROGEN. Be sure to use the complete treatment.

Write for free bulletin, "Black Spot Control"

ROSE MANUFACTURING COMPANY

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Fungtrogen
FUNGICIDE AND STIMULANT
REG. U.S. PAT. OFF. PAY OFF.



Bring the glory of the hills to your home

NOTHING is more beautiful than the glorious spring blooms of Rhododendrons and Azaleas—modest white, soft orchid pink to orange yellows. Our nursery-grown native Rhododendrons can come to you at very reasonable prices. Catalog on request.

Special offer for \$25 includes 12 plants, 1 to 3 feet high, ten different, enough to cover 25 to 40 sq. feet. The blooms are from white to orange, April to July—a wondrous series of blossoms.

La Bars' broad-leaved evergreens call for no maintenance expense. Cold will not kill them. They blend with all forms of architecture. Our nursery-grown stock conserves native forests.

Price for this superior collection only \$25, packed, f. o. b. Stroudsburg. Please send check with order.

Each plant marked and guaranteed true to name. We have the largest Rhododendron nursery in America.

Visitors welcome to nursery. Write for full list of shrubs in this offer.

LABARS' RHODODENDRON NURSERY
Box M STROUDSBURG, PA.



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The Vegetables and Flowers you would like to see growing in your garden—read all about them in Burpee's

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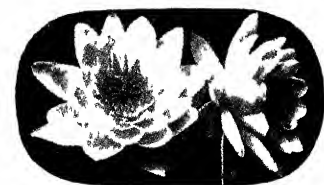
This is the catalog that tells the plain truth about the *Best Seeds That Grow*. It describes the Burpee Quality Seeds, Bulbs, and Plants.

Write for a free copy of Burpee's Annual.

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WATER LILIES



Suggestions on the building and care of a pool, profuse illustrations, many in color, interesting descriptions of over 100 varieties of rare and exotic lilies, as well as inexpensive post-paid collections, and many other features—all are to be found in our 1930 catalog. This beautiful 36-page hand-book of water lily lore will be sent to you FREE for the asking.

Johnson Water Gardens
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New Discovery Guarantees Better House Plants & Gardens

This new, easy, economical method of fertilizing is being praised by everyone who tries it. A highly concentrated plant food in tablet form

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ODORLESS PLANT FOOD TABLETS
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FREE Booklet by F. F. Rockwell, noted writer of garden books. Full of valuable information, free with every box of genuine Plantabbs. Ask for Fulton's Plantabbs—accept no substitute. Sold widely by seedsmen, florists, hardware and drug stores. Sent prepaid if your dealer cannot supply.

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MAKE your garden the envy of your friends with Gore's Hardy Vermont Glads. Best of garden cut flowers—very easy to grow. Our special "get acquainted" offers will make you an enthusiastic "glad fan." Bulbs guaranteed to bloom first year.

100 Large (1" to 2") \$3
Vermont Bulbs

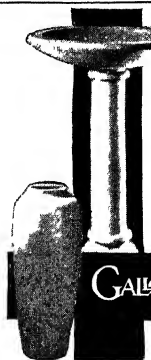
This collection includes at least 35 fine varieties, in many shades of Red, Yellow, Pink, Blue, Orange, Smoke White, all good ones but not labeled as to name. \$3 for \$1.75. All sent prepaid with complete instructions for growing prize winners. I believe this to be the finest "glad" collection offered anywhere.

Specialty Collection

Annie Laurie, exquisite ruffled Pink, Emily Auburn, luscious bronze, Apricot Glow, beautiful apricot-colored, Golden Dream, finest clear yellow, Marinka, very large Orange. All five rare varieties—labeled \$1. (regular \$1.50 value). Both collections prepaid for \$3.95. Send for illustrated catalog "that is different", listing over 300 of the world's best varieties.

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3209 Como Ave. 2407 Chestnut St. 198 Cedar St.

Burroughs Observance

Elsewhere in this issue is told the intimate story of a friendship with John Burroughs, whose birthday we celebrate this third day of April. One of the observances will be held at the Grand Central Palace, New York City, under the joint auspices of the N. Y. State and City Federation of Women's Clubs. Mr. Alexander MacDonald, State Conservation Commissioner, George F. Unger and George J. Gillespie will be among the speakers. The meeting will be an all day affair and open to the public. Mrs. Charles Cyrus Marshall is chairman of the program.

Saving Lives

A chemical device to replace mufflers on automobiles, which will eliminate carbon monoxide gas, which has taken so many lives of careless automobilists, has been developed by Dr. J. C. Frazer, professor and chairman of the Department of Chemistry at Johns Hopkins University. His experiments now are confined to perfecting a practical device suitable for attaching to cars, and a company has been formed to manufacture it, once completed. The process, although now secret, is said to change the carbon monoxide into harmless carbon dioxide gas. It will be a welcomed product on the market.

Fight to Death

During the mating season, buck deer are very prone to quarrel, and occasionally their horns lock in battle in such a way that both are unable to feed, or become the ready victims of predatory animals. Grim evidence of such a tragedy was recently discovered by Robert Cowart on the Tosohatchie game preserve in the eastern part of Orange County, Florida. The skulls of two deer were found with the antlers attached and part of the skeletons remaining. Conditions indicated that the battle had taken place last September.

In South Carolina

Among the states wide-awake to the billboard problem in its relation to the beauties of the state is South Carolina. The State Federation of Women's Clubs is conducting an energetic campaign which is bringing very tangible results in awakening public sentiment. An effective little folder has been prepared and is available in connection with this work. Copies may be obtained from Mrs. John Drake, Columbia, South Carolina.

Buck Replaces Granger

Following the appointment of C. M. Granger to head the nation-wide survey of forest resources, C. J. Buck has been appointed to be District Forester of the Pacific Northwest National Forest District. He has been for some years in the Northwest office.

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"ON WESTERN TRAILS"

Mention NATURE MAGAZINE when answering advertisements

10 Gladiolus Bulbs 10¢



Choose mixture of colors, finest named varieties, blooming size. 10 for 10¢; 50 for 50¢, 100 for \$2.00; postpaid.

Regal Lily 10¢

The finest of all Lilies, hardy everywhere. Immense clusters of flowers, with individual blooms 6 inches in length, stems 4 feet tall, color, white, slightly suffused with pink and a beautiful glow of canary yellow at center. One year old 10¢ each; 15 for \$1.00, postpaid.

Blue Spruce 75¢
4-year old trees
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Catalog Free
Burgess Seed & Plant Company

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Now You Can Have WATER LILIES in Your Own Garden

Make the charm of your garden irresistible with a Lily Pool Plan to grow the most delightful different flowers this season.

Our New
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A dependable guide to building and planting the Lily Pool. Describes all types and varieties of Waterlilies and Water Plants, lists Ornamental Fish, Aquariums and Supplies. Send for your Copy NOW.

ARLINGTON WATERLILY GARDENS
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Kills Dandelions Easily

Marvelous New Treatment DOES NOT KILL the GRASS



Simple and easy to use. Quick and permanent results. Non-poisonous. Just sprinkle your yard with DANDELIX, and PRESTO—Dandelions wither up and die. Rid your lawn once and for all of these obnoxious pests, and have a dandelion-free lawn. Users say "Dandelix is the right thing at last to rid us of dandelions." "Send me another bag." "I got good results with Dandelix." And so on. Tell your neighbors about this scientific preparation, and club together getting special prices on quantity lots. Liberal supply, 20 pounds, enough for average lawn, only \$2.98. Have beautiful green grass. Satisfaction guaranteed or your money back. Order at Once!

MISSION LABORATORIES, INC.
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GARDEN FURNITURE

Send 10¢ for BETTER BUILT CATALOG showing almost one hundred attractive pieces for lawn and garden.

Satisfaction Guaranteed

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FRAGRANT ROSE ORCHID

The lovely little Calypso (Fairy Slipper) of Cascades Delightful bloomed early inside 10¢ \$2, with native soil, \$2.50, postpaid. Wild flower catalogue IRIS ACRES, Molalla, Ore.

Buds of Prey Defended

Framing the Birds of Prey" is the title of a highly informative pamphlet recently published. It calls the attention of all wild-life lovers to the organized efforts that are being made to educate the public in the belief that the growing scarcity of game is due to the ravages of "Vermin". To our mind the term "Vermin" is most fittingly applied to that class of human killers who are destroying America's incomparable wealth of beautiful and useful wild life, both game and non-game.

By campaigns of destruction, in which the arms and ammunition dealers are often the allies of the game killers, hawks, owls and eagles, with little regard for any particular species, are being exterminated. Classified with the real birds of prey as "Vermin" are many other birds, including herons, kingfishers, mergansers, grebes, loons, and pelicans, most of which are protected by Federal statute, and usually by state laws. Some of the methods of destruction, such as the pole trap, outlawed in some places by statute, and everywhere by enlightened public sentiment, other protected small birds are frequently tortured and killed. Thus Federal and State Conservation laws are violated, the sentiment of the law-abiding and humane-minded public is outraged, and the people at large are being deprived of a part of their precious birthright—all by a single limited class of our citizens.

The pamphlet calls forcible attention to the fact, daily becoming more evident, that those who love our native birds in life are coming to out-number the killers, and are growing in power.

It is announced that copies of this pamphlet can be obtained free, while the supply lasts, from Davis Quinn, 3548 Tryon St., New York City.

Kiwanis Nature Trail

McKeesport, Pennsylvania, has a Nature Trail and it is not provided by the local schools, the local Nature club or by some other naturally highly-interested source. It is provided and supported by the McKeesport Kiwanis Club, which apparently is equipped with a large supply of vision and real civic interest. If you are driving along the road just outside that city your eye will be attracted by a rustic arch, on which, spelled in wood, is "Kiwanis Trail". If you linger,—which you are invited to do because the trail is for all who are decent enough guests to leave things untouched,—you will wander through an outdoor museum where the native flora grows untouched, yet unobtrusively identified for you with appropriate markers. It runs through a section which is sanctuary for birds, and the bird lover will see and hear many of his avian friends. The trail, now entering its fourth season was fathered by Dr. W. W. Cowan, local physician, Kiwanian, and, of course, Nature lover. The club appropriated generously for its creation and maintenance and has a trail committee headed by Luke F. Savage. The City of McKeesport has cooperated in maintenance. Altogether it is a very happy idea, well done. McKeesport Kiwanis Club has shown the way. Who will follow?

Why Our Rockery Plants So Unfailingly Succeed

SEND 25 cents for our illustrated Booklet. Gives you full directions how to make a Rockery. Tells you both what to plant and what to do.

The cost of the booklet may be deducted from your order for Rock Plants. In it you find practical information. Following it and planting our plants you'll succeed

with your Rockery. All our plants are husky, field-grown clumps. That's why they succeed. Need no coddling. They bloom the first year. Plants are guaranteed to reach you in perfect condition. If not we cheerfully replace them. Send for our Hardy Plant and Rock Plant Catalogue. It is the best published in America and FREE.



Wayside Gardens

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SCOTT'S Creeping Bent

Makes Lawns Like Velvet

By the nature of its growth, Creeping Bent prevents weeds from getting the strangle hold. With proper care no re-seeding is ever necessary. You'll have a deep, thick, uniform turf that's everlasting and

Makes Your Home a Beauty Spot

We have heard this comment on a Bent Lawn: "It's so perfect it looks artificial." Do you want this said of your lawn? Then, read all about this unusual grass in our illustrated booklet "Bent Lawns," which will be mailed on request. It is a valuable treatise on how you can have beautiful lawns.

O. M. SCOTT & SONS COMPANY

361 Main Street

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Give More Pleasure and More Beauty than a Garden of "Novelties"

For simple culture, for beauty and for fragrance Waterlilies have no rivals. The smallest garden may have a pool, even a porch or roof-garden is not a barrier, for Waterlilies thrive in common washtubs. Wonderful colors, from pure white through pink, and red to deep purple, will make the tub or pool the center of garden interest.

A NEW CATALOGUE

is now ready. In addition to many varieties of Waterlilies, you will find descriptions and pictures (in color) of Japanese and American fancy fish for pools and aquariums, water plants and supplies. A copy will be mailed on receipt of your name and address.

THREE SPRINGS FISHERIES

20 Pythian Bldg. Frederick, Md.

ROSE TREE



The ROSE TREE OF CHINA (Prunus Triloba) is the most beautiful and showy of all small trees. It begins to bloom before the leaves appear in the spring, being literally covered with very double rose-like pink flowers. As an ornament from early spring until late fall it has few equals. This symmetrically formed, graceful little tree grows usually to a height of but 8 feet, and is attractive as a specimen or when planted in groups or shrub border. It is hardy and easily grown, and no lawn is so small that room can not be found for at least one of these wonderful trees. Many who have seen it declare it to be the most beautiful tree they have ever seen. The rose-like blossoms make fine cut flowers. Choice trees for \$1.00 each; 3 for \$2.50. by parcel post, postpaid.

SPECIAL For 50c extra we will include three small TULIP TREES—fine ornamental shade trees with tulip-like flowers.

Our stock of trees will not last long at these low prices. Order now, and state when you want trees shipped. CATALOG FREE. BURGESS SEED & PLANT CO., 3401 T., GALESBURG, MICH.

GLADIOLUS BOOK FREE!



Send for my new 36-page Gladiolus Book, describing 175 exquisite varieties, many new. Tells how to grow 45 illustrations. It's free!

My famous beautiful RAINBOW COLLECTION will delight you. 1 bulb each of 30 varieties (not labeled) all colors, blooming size, planting hints included, satisfaction guaranteed, \$100 postpaid.

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The most complete analysis of the modern Iris in print. A review of over 1500 varieties is a feature of this compilation.

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5 Glorious Beauties for \$1.00

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\$2.75 worth of Dahlia tubers for \$1.00

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It must be impervious to moisture, must retain its markings, and must not girdle the Plant—WE HAVE IT

Sample Line for the Asking

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2175 East 76 St. Cleveland, Ohio

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Evergreens: Rhododendron, Max, Kalmia, and Hemlock Seedlings 6 to 18 in., \$100, \$6, 2 to 4 ft. 25, \$5, 100, \$18. Carload for, \$150.00.

J. F. NORRIS Doeville, Tenn.

IRIS

German, Japanese, Siberian and Spanish

Send for catalogue

LAKE IRIS BOTANICAL EXPERIMENTAL GROUNDS
Ashtabula, Ohio

EVERGREEN SHRUBS

Rhododendron and Mountain Laurel 2 to 4 ft. 25—\$6, 100—\$20. Hemlock 2 to 4 ft. 25—\$6, 100—\$20. Fancy Holly 2-4 ft. 25—\$8. Write for our wholesale price list.

Forest Evergreen Co. Box 29 Doeville, Tenn.
FLOWERING EVERGREEN SHRUBS, 2 to 4 ft., 10 Rhododendron, 10 Mountain Laurel, 10 Hemlock, 10 Fancy Holly, all for \$10.00 or 25 for \$6.
Doeville Collection Co., Doeville, Tenn.

THE BLUE CARNATION

BY BEN HUR LAMPMAN

It is a worthy ambition the English florists have. They are endeavoring to grow a blue carnation, a flower never attempted by Nature, even in the multiplicity of variations that are wrought by cross-fertilization and by environment. And a blue carnation would be a handsome bloom, no such painful desecration of beauty as is the pitiful green carnation of St. Patrick's day, its petals dyed for the occasion. They give the faded white carnation a green cup to drink on the day before the festival, and it becomes that curious bilious blossom which commemorates the great opium drive. But a blue carnation, compounded of sun and rain and soil, skillfully shepherded by a true gardener—such a flower would be a triumph long to tell.

Gardeners have done much with flowers, and if they have aided Nature there should be none to chide them, since they have added to beauty's store as well. At most they have achieved only those effects which were possible in Nature, and which under fortuitous natural circumstances would have been wrought by the wise old mother herself. For that matter, improved and varied coloration, altered form and changed season, have all been the work of Nature manifesting herself through the skill and comprehension of good gardeners. Yet she yields not all, nor many, of her secrets. The blue carnation still eludes them.

Black tulips are grown nowadays for the perfumer, yet one seems to recall that the black tulip was once a floral ignis fatuus, dreamed of on a thousand pillows, yet ever somewhere out of reach. Of tulips generally it is true that no flower has been more greatly changed by the friendship and sympathy of the gardener than this one. A tulip once swept western Europe with a fervor for its culture that is comparable only to the buoyant projects of plantation days. Few tulips now resemble, save superficially, the wild stock whence they sprang, and cultivation has so divided the species as to render identification and naming difficult beyond practicability. The creation of new varieties in Holland, early in the seventeenth century, brought to pass such intemperate speculation and consequent ruin as caused the government to intervene. At the height of the frenzy as much as 1300 florins was paid for a single bulb, and stock companies were formed with such a bulb as their only asset. The tulip in your garden is historic. Ten to one its floral ancestors, in direct line, once set all Holland by the ears.

To search for the reason of color is not to grope in the dark, since with more or less difficulty the chemical constituents of floral colors have been segregated. This does not answer the question, however, for men cannot know why it is that a certain bloom

The Original Etching of the Bok Singing Tower

in the December issue was etched specially and exclusively for Nature Magazine by Benson B. Moore, noted wild life etcher. So far as we have been able to discover it is the ONLY ETCHING OF THE TOWER in existence. Thirty-five proofs were taken of this etching and the plate destroyed. There are left available five proofs, all signed by the etcher.

These five etchings will be sold for \$12.50 each as orders are received.

NATURE MAGAZINE

1214 16th Street

Washington, D. C.

Choose from Our 75 Varieties of

Beautiful WATER LILIES



These richly colored, fragrant, easy to grow garden flowers may be planted from April until the last of August. Ours are the largest Aquatic Gardens in America. Every root guaranteed! 75 beautiful Varieties from which to make your choice in our free, illustrated Catalog. Send for it NOW.

The W. B. SHAW Aquatic Gardens
Dept. A, Kenilworth, Washington, D. C.



Oriental Flowering Trees

America's Finest Collection

Japanese Rose Flowering and Weeping Cherries, Flowering Crabs, in all varieties and sizes. Send for free book with color illustrations.

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should show a preference for the creation of yellow pigments, and another for those that are scarlet, and a third for purple dyes. Nor can they comprehend the subtle chemistry by which the flowers confirm their choices. All that they do know is that protoplasmic granules of colored pigments are present in the petals, or in the cell fluids, and often in strange yet ordered patterns. And they cannot guess why carnations are so sweetly stubborn about being blue.

Gardeners have tried these many years to create a blue rose, and there have been some pretensions to the honor of achievement. Yet the "blue" rose never is blue. It is a sickly compromise, far from cerulean and altogether depressing to look upon. A rose as blue as the cornflower, a rose of Tyrian purple—what flowers they would be! Or a blue carnation. The reward is worthy of the quest.

ORANGE BLOSSOMS ON YOUR LAWN

BY G. G. NEARING

You can grow your own orange blossoms outdoors if your locality is no colder than Philadelphia—or even farther north by giving shelter and protection from the wind.

The Hardy Three-Leaved Orange (*Poncirus trifoliata*) will thrive unprotected in the open in southeastern Pennsylvania. Spring clothes it in large white fragrant flowers, and even more strikingly its golden fruits nestle among the dark leaves in October.

Do not try to eat them. Inviting though they look, the pungent gummy juice permits no liberties. Tiny oranges with lemon-like beak and a downy skin, their only uses are to beautify the landscape and bear their numerous seeds.

The Hardy Orange grows into a small gnarled tree twelve or fifteen feet high. The deep color of the leaves might lead you to hope that they will not fall, yet the grown tree is not an evergreen, though young specimens keep part of their leaves all winter where protected from the wind.

The winged twigs, however, retain their green color, and if regularly sheared, become so dense that the effect is almost that of an evergreen even after the leaves have fallen.

For a protective hedge *Poncirus* deserves high recommendation. Its thorns, an inch or two in length, offer a merciless front through which neither man nor beast can pass. It does not outgrow its place like the Osage Orange, nor put out long soil-robbing roots as many hedge plants do.

Furthermore it prefers a strong soil, even clay, and transplants easily at almost any season. In northern localities it is safest moved in spring or summer and with a ball of dirt.

The blossoms appear early in spring before the new leaves. They are real orange blossoms, but of two types. On some trees occurs a form with narrow petals, not nearly so fine as the normal shape. It is best to plant the broad-petal form.

A good tree of the Hardy Orange gives you three beauties—the bloom, the fruit, and the deep green foliage.

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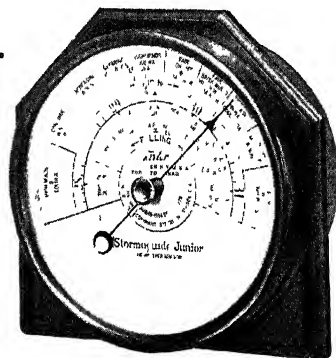
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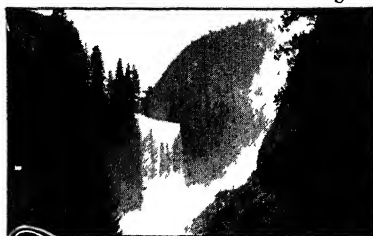
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"LITTLE TOAD WITH THE TINY TRUMPET"

BY COLIN CAMPBELL SANBORN
of Field Museum of Natural History

All countries hold strange and interesting forms of life, one a queer mammal, another, a strange bird, and another curious insect, or reptiles. Among the Amphibians are many species especially interesting on account of their unusual habits in the propagation of their race.

Darwin's Toad is, perhaps, the most remarkable example of this, for the male has all the cares of the family, while the female has only to lay the eggs. This toad lives in the cold, damp forests of Southern Chile, from Concepcion southward. It was first discovered in 1835, probably in the Province of Valdivia, by Darwin, who at that time was the naturalist on H. M. S. Beagle during her famous trip around the world. It was named *Rhinoderma darwini* in his honor.

During my recent work in Chile I was ever on the watch for this fellow. It was not until I reached Lake Rifiñhue in the Province of Valdivia that I found them in any numbers.

Lake Rifiñhue lies in the foothills of the Andes, surrounded by virgin forest, the wet mossy floor of which is never touched by sunlight. Little brooks of icy water flow down the hills, winding in and out among the trees, on their way to the lake. Here and there they form a small bog or swamp and in such places Darwin's Toads were very plentiful. From here they ranged through the forest until one could truthfully say, "the woods were full of them." The dark, gloomy forest echoed all day with their calling which is a soft whistled peeping repeated three or four times.

This little toad is not more than an inch long, including the tiny projection at the end of the nose. The Chileans call it "*el sapito con la trompita chiquita*" or "the little toad with the tiny trumpet."

While one might say that these toads all wear the same black and white trousers and vest, with variations in pattern, their coats are of different shades. Some are bright green, others dull green, some are grey, others tan or brown, and still others are almost black.

Darwin secured the first specimens of this species, but their remarkable breeding habits were reserved for subsequent discovery. The first observer to find individuals with abdomens swollen with young was Claudio Gay, the author of the famous "Historia de Chile." He supposed, and naturally enough, that these specimens were females, and that the young were born alive instead of being hatched from eggs.

More detailed examination by Jimenez de Espada, the great Spanish herpetologist, in 1872, revealed the fact that such swollen specimens were males. Also, that the pouch in which the young developed was in reality the enormously enlarged, internal vocal sac.

Most frogs and toads have some form of vocal sac, either external or internal, which can be widely distended when the animal calls. This sac is transformed into a brood pouch in Darwin's Toad. It lies just under the skin of the belly, and extends to the groin, covering the entire under surface of the body. Proportionately, it is the largest vocal sac to be found in any

of the amphibians, but it probably never reaches this unusual size except during the period of the development of the eggs and young

How the eggs are deposited and fertilized, and how they are placed in the mouth of the male parent, has never been observed. The numbers of young found in a single male varies from eleven to sixteen. The emergence, which is apparently not assisted to any degree by the male, was observed by Krefft. He reports that they were deposited as tadpoles, some before and some just after the stage at which the arms appear externally. Other observers have found completely developed froglets in the pouch.

Many tropical frogs do develop completely within the egg, and do not go through a tadpole stage. The large yolks with which the eggs are provided in such cases being sufficient for their entire period.

Many cases of peculiar breeding habits of amphibians are found to be due to the absence of normal water conditions under which our familiar species breed. It seems likely that in the case of Darwin's Toad, the fact that they are found chiefly in the neighborhood of swiftly running mountain streams in which eggs would be swept away, has developed this curious habit on the part of the male. An extraordinary parallel to these breeding habits is found among the ocean cat-fishes, in which the male carries the eggs in his mouth until the young are hatched.

It is to be hoped that some day a few Darwin's Toads will be brought here, that they may be more intensively studied and another of Nature's mysteries satisfactorily solved.

ALMOST A TRAGEDY—A JUNCO STORY

BY R. BRUCE HORSFALL

In company with others of his kindred in feathers, a small snowbird started on his southern migration one beautiful day in early October. They left the land from some customary point of departure and struck out over the trackless waste of Atlantic waters for the winter home in the South. How he became separated from his fellow travelers one can not know. It may have been that they had begun their journey the evening before as most small birds do, and he had lost contact and direction in the dark, and was now winging his way alone, a lost and tired little land-lubber.

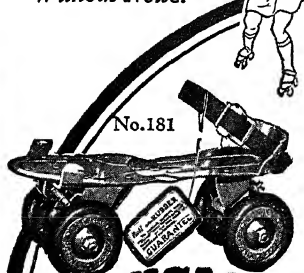
The morning hours dragged slowly on with no land in sight and only the restless waters beneath. Still he held bravely on confident that somewhere in the South was the land of his hopes and dreams, and knowing not that he had missed the direction and was going ever farther out to sea. That the shores veer to the westward he had no way of knowing.

At last—to his intense relief—for he must have been nearing the end of his powers—appeared in the distance the top of a dead tree—two trees in fact, and between them two blackened stumps of still larger trees broken squarely off midway of their boles. The yellow of the freshly broken tops shone in the sun.

Where there were trees, there would be land and the little traveler put forth all of

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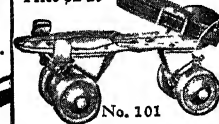
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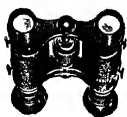
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his remaining strength to reach it, too tired to do more than just skim the dancing waters. He had been hours and hours on the wing.

Presently the land itself came into view. It was only a small blackened island of queer shape, but it was his only chance for a rest in all those troubled waters and he strove the harder. With an extra effort and with the aid of the back-draft of the moving vessel the little Junco dropped on to the taffrail and squatted unmindful of the many humans passing and repassing before him. Saved at last, but he could get no further. He was spent. An hour later he fluttered to a gentle hollow in the canvas of a covered life-boat.

Had we not been so far out at that particular time this Junco story would have had another ending. Until long past noon the birdling rested. Then the wind veered a trifle and brought down upon him a shower of biting, stinging cinders. That was too much for any bird to stand and he flew out behind the boat a short distance. Then apparently for the first time he saw a long curving snow bank glistening in the sun behind the queer island. Now, snow was his accustomed winter hunting ground and he gladly flew down to it only to sink deeply in when he tried to alight.

Again and again he essayed the seething shifting white band and I thought we had surely lost the little fellow as we left him far behind still endeavoring to find a foothold on the unstable waters. About an hour afterward I again espied him perched on the latticed rope under the hand-rail. When evening settled over the waters he was still with us having in the meantime picked up a few crumbs thrown out by kindly hands.

When the sun again rose over the sea we were passing Sandy Hook and although I did not see him go I have faith that the little Junco had left with the earliest streak of dawn and had found his real tree-covered land of promise, his goal through weary hours.

A Hiking Vacation

Dyrus and Edith Cook, artists of Woodstock, New York, have evolved some interesting and unique vacation trips for those who love to hike. They have selected neglected trails in the Catskill Mountains for these trips, five days in length and they sound interesting. Possibly some of our readers will be interested and we pass the information along, quoting three paragraphs from the announcement of the plan.

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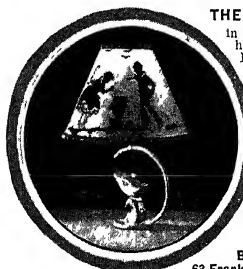
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Delightful Child Verse

Rich in imagination and charming in simple poetic form is *Around a Toadstool Table* by Rowena Bastin Bennett. The poems are about things of action and expressed much as the child mind sees them in all their newness and quasi-mystery. We have tried them on our four-year-old—who is, of course, an unusual child,—and her strict attention and insistence on a complete reading of the book is the best review we can give. Permit us, however, quotation of one verse, called "Under the Tent of the Sky", which goes

The wind cracked his whip,
The storm flashed a gun,
And the animal-clouds marched one by one
Under the tent of the sky

There were elephants, blue,
And shaggy white bears,
And dozens and dozens of prancing gray mares
With their beautiful heads held high

In a review of this charming book of verse for youngsters, it would be unfair not to mention the delightful drawings made for it by Lucille Webster Holling. They have caught the author's verve in fine fashion. The publishers are Thomas S. Rockwell Company, 209 W. Jackson Boulevard, Chicago. The book is listed at two dollars and we heartily recommend it.

R. W. W.

Scientific Book Club

Those interested in Nature and Science now have a book club themselves in the Scientific Book Club. It is fashioned along the prevailing lines of a book-a-month, but specializing in books of interest to the layman who has a flair for the scientific. A distinguished editorial committee and advisory board assures that its selections will be worth while. The club announces that "although strictly authentic, books recommended are not technical in any narrow sense, but are written in a manner to be clear and understandable to the lay reader." It is planned to cover all branches in science during the year.

New Bulletins

Three new bulletins that have come to hand and are of more or less specialized interest. *The Habits and Economic Importance of Alligators*, being Technical Bulletin No. 147 of the U. S. Department of Agriculture, considers the state of the alligator today with relation to commerce and civilization. It is by Remington Kellogg. *Quaking Aspen*, being Technical Bulletin No. 155 of the U. S. Department of Agriculture, is a study in applied forest pathology written by E. P. Memecke. *New Land and Fresh-Water Mollusks from South America*, written by William B. Marshall and published by the Smithsonian Institution, covers what the title suggests.



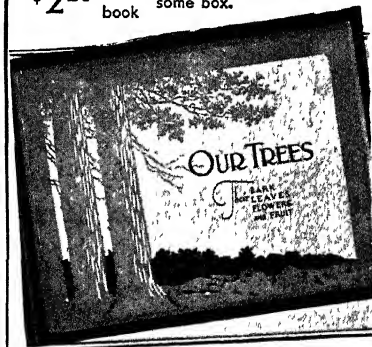
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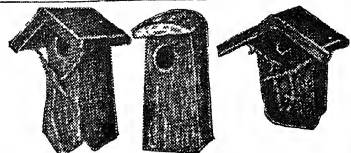
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Bird Studies in the Wild

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The Insect World

From our experience birds seem to hold the interest of the majority of Nature lovers while insects appear to run a rather close race with wild flowers for second place. The range of the insect world, of course, is wider than the others, and hence often more baffling. But by reason of its immensity of forms its fascinations are multiplied. If there is any volume which will tend to make one "insect conscious" it is *Insect Ways* by Clarence M. Weed, just issued from the presses of D. Appleton and Company. Its author needs no introduction to those acquainted with worthwhile Nature writing, and in this latest book he has told, with his usual charming style, a fascinating story. It should be read before the Spring is upon us, because the stories it tells will make our spring and summer walks the more fascinating for the interesting events of the insect world we will be inspired by this book to observe. It is listed on our Book Page and may be ordered through Nature Magazine.

For The Gardener

Gardeners will find it extremely helpful to add to their library a copy of *Herbaceous Perennials* and they can do so for the expenditure of fifteen cents sent to the Superintendent of Public Documents, Washington, D. C. This booklet is Farmers' Bulletin No. 1381 of the U. S. Department of Agriculture and is the work of Furman Lloyd Mulford. It deals with the use, arrangement, culture and propagation of herbaceous perennials and gives regional data on their planting. The bulletin goes beyond the plants ordinarily listed by dealers and makes many valuable suggestions which should be of distinct value to gardeners. When such excellent bulletins as this come to our desk from the Government Printing Office, we are often moved to regret that more people are not acquainted with and taking advantage of such services as this one, performed for them by their government.

Bird Rhymes

Some time ago we reviewed with pleasure a little volume of verse under the title of *Bird Rhymes*. The author is Bert Dayton. The book has been generally well received and is now brought out in a less expensive edition with paper cover. The present price of the little book is thirty-five cents and four copies may be had from the Palisade Press, 125 Church Street, New York City, for one dollar.

Poems For The Tots

In *Little Poems for Little Folks*, Viola Dare has presented a group of short and whimsical little rhymes designed to be read and reread to the youngsters in those moments when reading is the next thing to be done. The Stratford Company, Boston, are the publishers and the price is one dollar.

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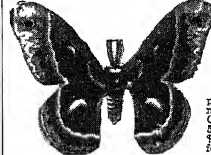
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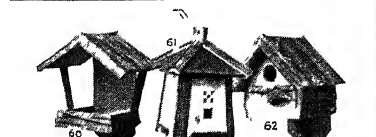
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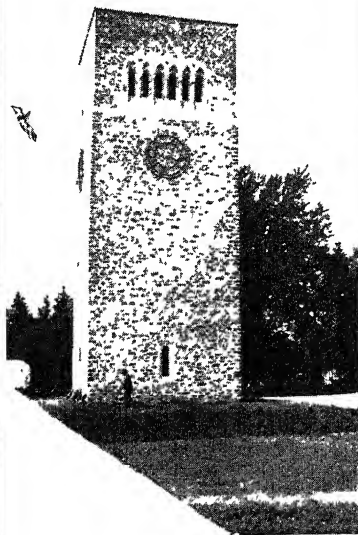
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Tree and Flowers

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Another Carillon

Publication in our Florida issue of the etching of the Bok Singing Tower at Lake Wales, Florida, brought much appreciative comment. Miss Enid Johnson of Simcoe, Ontario, Canada, writes in appreciation and also sends us a picture of another carillon. This stands in Simcoe and was erected as a memorial to the men from the County of Norfolk who fell in the Great War. The carillon has twenty-three bells. It was dedicated in 1925 and programs of concerts have been played upon it since then.

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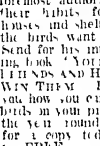
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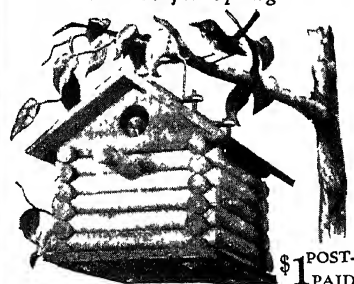
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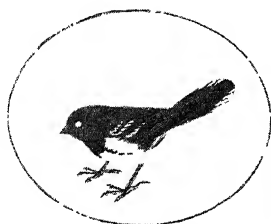
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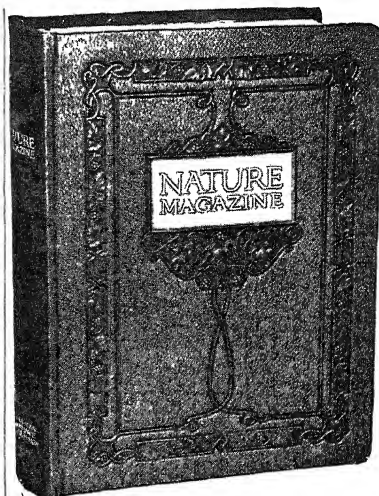
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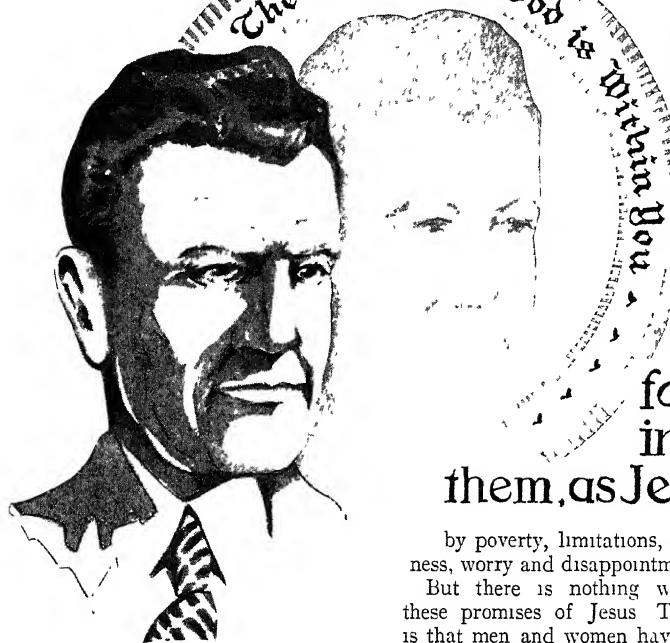
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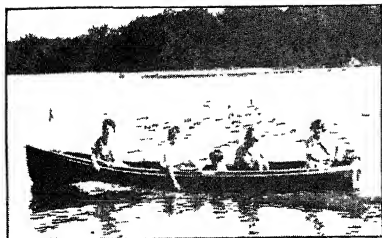
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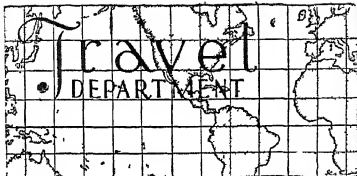
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* * *

The northern sections represent, probably as well as any in America, the rugged wilderness which the pioneers found. There are endless miles in all three states where the canoe is the only mode of travel and the lake and river the only highway. There are beauty spots where moose and deer come at eve to drink, muskrats and beaver shatter the quiet reflections on the lake waters. Perhaps the spectacular scenery and gigantic spaces of the West are lacking, but the 20,000 lakes, the great stretches of forest, the twining rivers have a different charm, just as alluring and just as tenacious.

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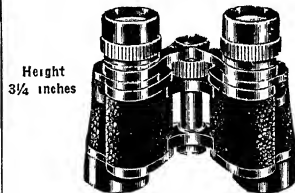
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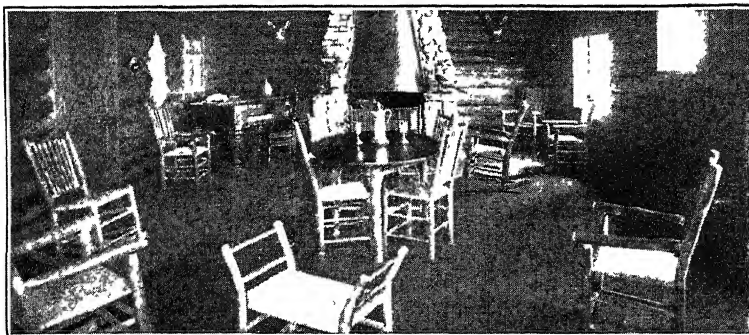
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At this time of year he or she who has a hobby of Nature photography is looking forward to the summer's opportunities. We find in the March issue of *American Photography* (which, incidentally, should be subscribed to by all photographically inclined) a helpful suggestion written by A. Brooker Klugh, Nature editor of that journal, under the title "The Camera for Nature Photography." Here is what he says:

"I have recently received several inquiries to what is the best type of camera for Nature photography. The answer is that there is no one 'best' camera, if this means a camera which will do every kind of Nature work under all circumstances. There is, however, a type of camera which will do about ninety-five per cent of the work which is included within the range of Nature photography, and which will, incidentally, prove to be nearly a 'universal' camera, as far as all kinds of work—landscape, portraiture, generic, photomicrography, etc.—are concerned. This is the all-metal, double-extension, plate camera, fitted with a compound shutter and an anastigmat lens of from $f/4.6$ to $f/6.8$. Such a camera will handle all the phases of Nature photography, with two exceptions, these exceptions being the stalking of mammals and birds and the taking of flight pictures of birds. For these two phases of Nature photography the only type which meets the requirements is the reflex, and it should, for these purposes, be fitted with a telephoto lens.

"The chief points about the camera advocated above which render it especially suitable for Nature photography are as follows: The all-metal construction gives strength and compactness, and both of these features are of great value in Nature work, where the camera has to be carried on all sorts of trips and set up in all sorts of places.

"These all-metal cameras are always, as far as I know, supplied with single metal plateholders, and this type of plateholder I have found to be eminently satisfactory, both as to light-tightness and durability.

"That a camera for Nature photography must be a plate camera is quite apparent, firstly, because focusing on the ground glass is absolutely essential, and, secondly, because panchromatic and superspeed emulsions—which are the two types of sensitive material needed in Nature photography—are available only in plates and film-packs, which latter can, of course, be used only in a plate camera.

"The double-extension feature is one which is essential, as a great many subjects in Nature work are taken at such close range that the bellows length of a single-extension camera is entirely insufficient. With a double-extension camera life-size images may be obtained.

"The compound, or compur, shutter, is, in every way, a very satisfactory shutter for Nature work. It is not only durable and reliable, but has a range of speeds which includes $\frac{1}{4}$, $\frac{1}{10}$, $\frac{1}{2}$, and $\frac{1}{2}$ seconds, which are very useful speeds in Nature photography. (Continued on page 347)

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NATURE MAGAZINE is published monthly by the American Nature Association
Entered as second-class matter May 31, 1927, at the post office at Washington, D C
Additional entry at Greenwich, Conn
Publication and Editorial Office, 1214 16th Street, N W, Washington, D C
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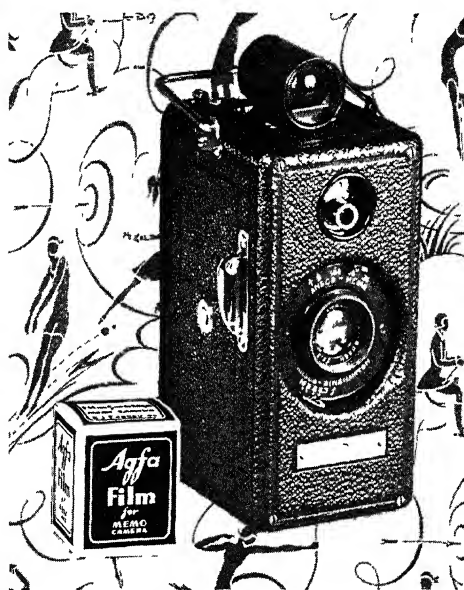
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Frank W. Benson

THE LOG JAM

Reproduced from an original
etching by Frank W. Benson
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Benson and George Gage



THE LUMBERJACK

by Tom Gill

FROM out America's yesterdays emerges one of the most colorful characters in all our history—the lumberjack. He stands apart. His home and life were the untrodden forest. He was an outpost of civilization, a conqueror of the wilderness, a pioneer. And he was wholly American.

To provide a nation's wood—that was the work of the lumberjack.

So through the Lake States' brief heyday of timber sovereignty he reigned, cutting the great logs of pine and spruce, driving them down the white waters of forest streams in flood time. His martial music was the ring of the axe and the saw's hum. Forests, centuries old, bowed at his coming. Before him the wilderness melted. Through cold, desolate winters he hewed the tall, straight trees. Each spring he rode the great logs down swirling waters to the world of men. He diced with death among falling timber. He defied the storms. He toiled in the very face of destruction, beneath the grinding menace of many a log jam, and he did it all with a careless laugh and a song.

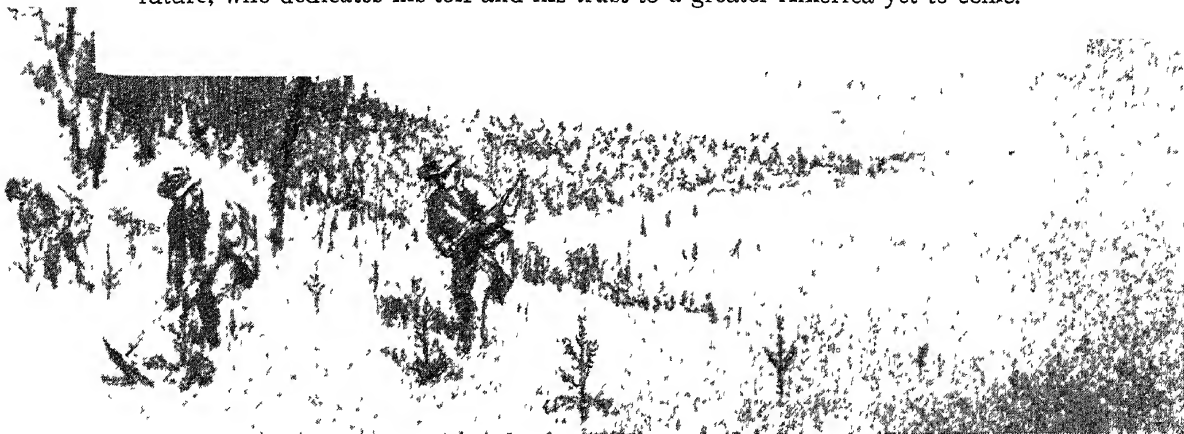
Those songs still linger and have become a part of our tradition. That story of his long, bitter fight against snow and flood is one with the saga of America. His turbulent reign was short, yet he has left an enduring imprint in the history of a pioneer nation.

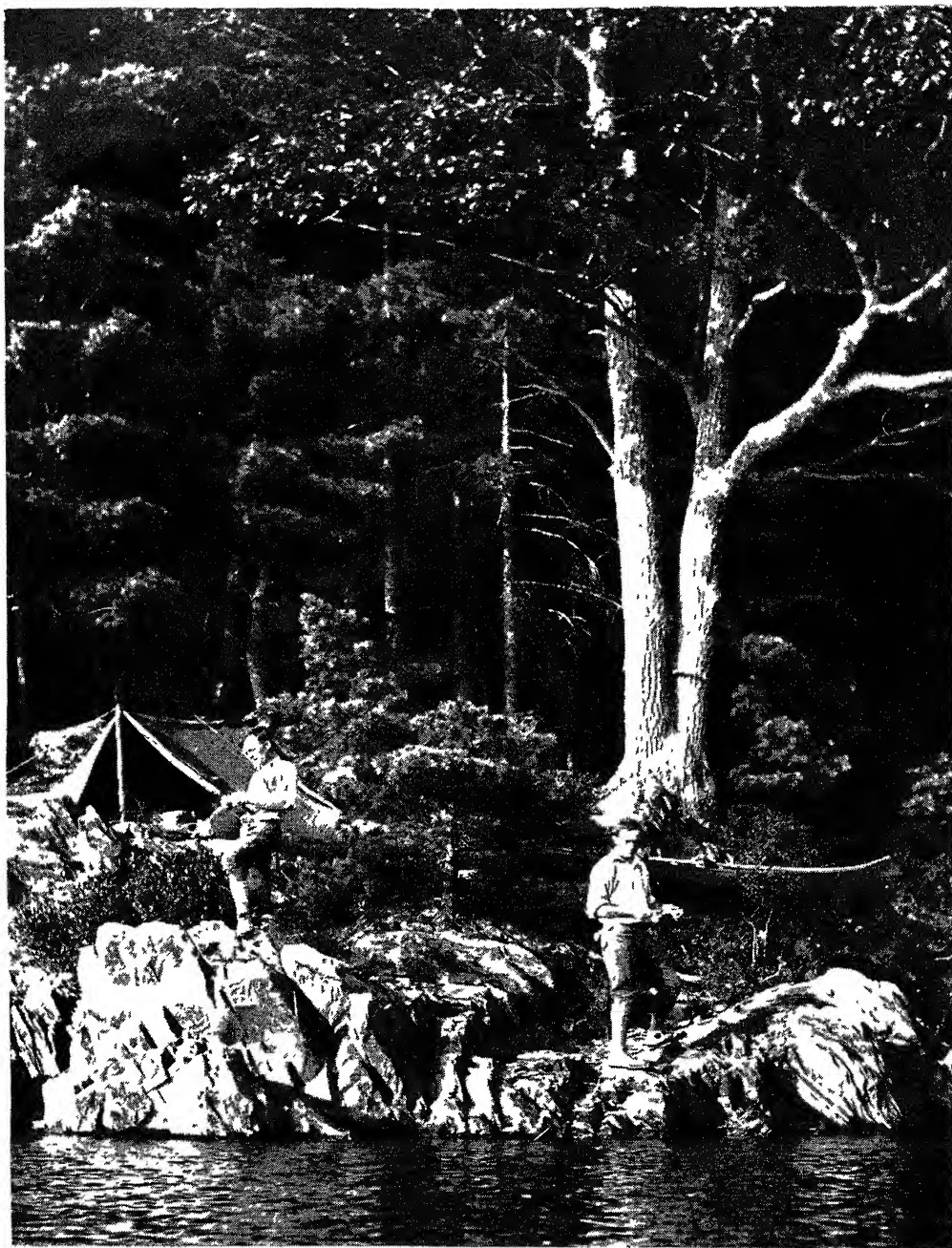
But he himself has passed. From the Lake States he has vanished as completely as the fragrant forests that were once his life. The roads he built are choked with brush and weeds. His camps are mounds of crumbling logs. Deer stalk silently among forgotten skidways and the long rafts of pine and fir float no longer down the rivers that once resounded to his shouts. The hungry mills he fed so faithfully are no more.

And with his passing too have vanished those age-old forests of white pine and red that for a brief time made the Lake States preeminent among the timberlands of all America. The forests that men called inexhaustible are forever gone. They are a memory that fades. They belong to yesterday.

The day of the planter has come. Among charred stumps and on many a wind-swept sand dune, men are planting the forests of tomorrow. Row after row of tiny seedlings—pine and spruce and fir. Slowly and with infinite toil they are creating man-made forests to take the place of those vanished forests of yesterday.

To the yesterday of the nation belongs the passing figure of the lumberjack. Tomorrow is the day of the forest planter. For he it is, secure in his vision of the future, who dedicates his toil and his trust to a greater America yet to come.





H ARMSTRONG ROBERTS

WHERE THE SIREN CALL OF THE LAKE
STATES GROWS STRONGEST

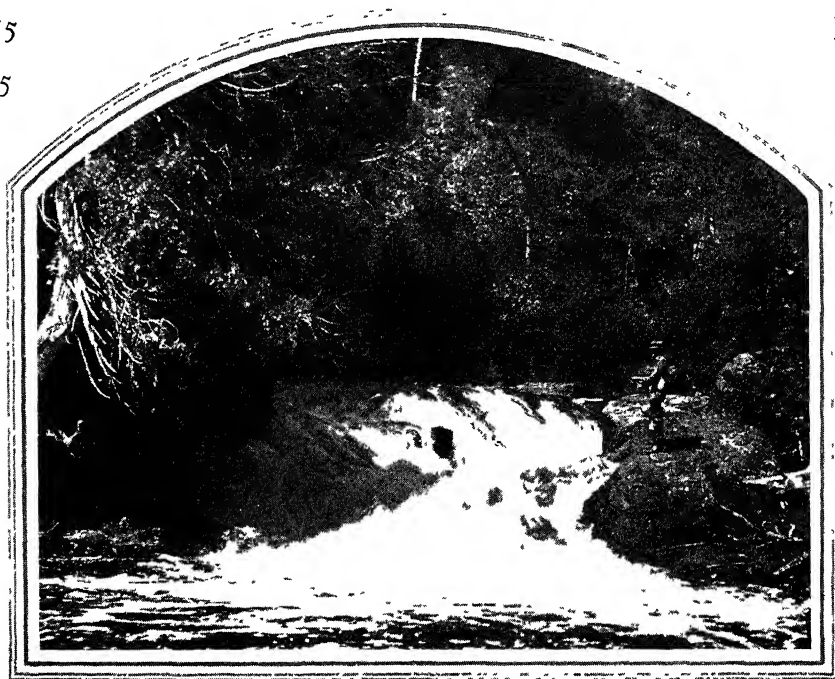
None can resist its rushing streams, alive with
fish, its trackless waterways, where canoes
glide gently; its far-spread forests, home of
wild life. Here are peace and health
and happiness for a nation

NATURE MAGAZINE

Volume 15

Number 5

May, 1930



MINNEAPOLIS CIVIC AND COMMERCE ASS'N

WHY THE LAKE STATES ARE POPULAR

Such spots as this, where forest and hill and swirling sunlit water conspire to steal one's heart, each year call back to Michigan, Minnesota and Wisconsin countless numbers of outdoor lovers

The Land of Many Lakes

An Analysis of Its Charm and Wealth

by Ben East

WOULD you fain visit a region where the blue waters of three vast inland seas stretch away to far horizons, where dark forests of spruce and pine and hardwood march over hill and through valley, and where bright inland lakes are cradled like countless jewels among the rolling green hills of farmlands?

Then come to the three states of the upper Great Lakes region, where Superior, Huron and Michigan, among the greatest of fresh water oceans, break upon their sandy shores or beat against the feet of towering cliffs

There you will find cool dim trails of the north country with soft pine needles underfoot and moss-bearded trees overhead. There you may drive a canoe through mile after mile of changing wilderness waterways. There you may build your campfire at night beside lonely forest-flanked lakes where deer come to water

in the dusk and where loons will awaken you at moonrise with their weird calling. There you may tramp along sandy beaches or by the shores of glacier-polished granite to hear the ceaseless whisper of the surf.

Dark forests clothe the flanks of granite mountains in this land. Broad prairies stretch to the horizon, mantled with the bronze of ripening wheat. Fertile fields, barren dunes of shifting sand, wild rice marshes and swamps of tamarack, cliffs and waterfalls dot the countryside. These you must find, to know the beauties that here make their home.

Fire and ice have shaped the Lake States country. Fire of ancient volcanoes that once belched forth lava in quantities that belittle the great lava beds of Vesuvius, but that today are only worn down stumps of mountains. Ice of the great glaciers, hundreds and thousands of feet thick, that crept southward day by day and century by century, more slowly than the sand dunes

creep now, reaching down like mighty plowshares into the valleys, furrowing them deeper, scouring the plateaus, dropping here and there burdens of soil and polished boulders, damming rivers, making lakes, and ever-changing the land and all upon it

From early spring until late winter the Nature lover and outdoorsman may always find enough to hold his interest in this border of the northland Spring brings the migratory birds back home from their wintering grounds in the south—the wild goose, robin and bluebird and a host of others In April a multitude of woodland voices ring out over the land, and May, enriched with the sweet songs of the bobolink echoing over the greenening marsh, ushers in the warm days

As early summer comes, the small birds of the woods raise their young and gulls and terns dwell in great noisy colonies on the islands of the lakes The whippoorwill sets the June nights pulsing with his cadenced calling Then, as the birds begin to gather for the long journey of autumn, a period of silence falls Now the great fall flight is on, and beach and field, swamp and forest are alive with the feathered horde—warblers, shorebirds, wildfowl, birds of prey—all drift-

ing steadily southward down the natural flightways

Even with the coming of winter, the pageant of bird life in these states does not cease Birds of prey—the savage raiders of arctic barrens and wooded northern wildernesses—sweep down with the winter blizzards Jolly oldsquaw ducks, scoters and other waterfowl of the far north come to the lakes, seeking open water for the winter, minding not at all the floating ice floes, the thick smother of snow that sweeps over the gray water, or the bitter winds

Even as the changing bird life marches with the seasons, so does the flower procession ever disclose new charms While blackened drifts of snow still lie in the cedar swamps and on the northern hillsides, that first bright flower of spring, the fair arbutus, peeps forth, and not even in the New England woods does it blossom more charmingly

than in the pine forests on the shores of Lake Superior, Huron and Michigan It follows closely the first pioneer of flowerdom, the humble skunk cabbage, beloved by bears emerging from their long winter nap Then come a legion of others—the strange pitcher plant, lady-slippers of pink and white and yellow and many another of the orchid clan, yellow and white water lilies,

and the rare American lotus On the pine lands, as summer advances, lupines blaze in wide blue meadows, wood lilies lift orange heads, bluebells nod in rock crevices, twin-flowers carpet the dimly-lighted floor of the forest Then the profuse march of summer thins out to the rear guard of fall, and the season closes with wild asters and goldenrod in a riot of color and fringed gentians nodding shyly in the marshes

The outdoor recrea-

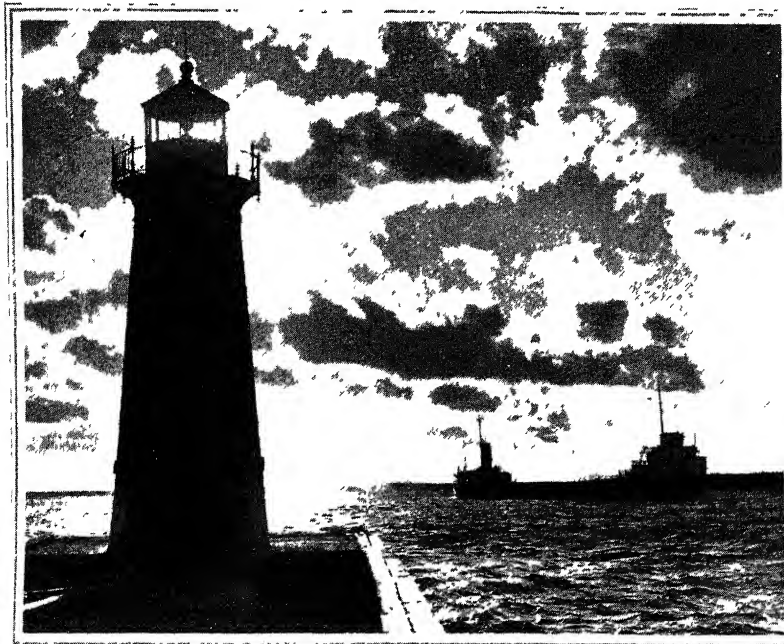
WHEN COMMERCE MINGLES WITH BEAUTY

Sunset on St Mary's River, one of the Lake States' waterways whose charm is equalled only by its usefulness to man



MICH. DEPT. OF CONSERVATION
CASTLE ROCK NEAR ST. IGNACE, MICHIGAN

Such rugged grandeur is typical of much Lake States country. Unfortunately recent commercialization has marred this spot.



A. E. YOUNG

tion of this region of lake, river and forest likewise follows the seasons. When spring takes the trout fishermen forth on thousands of miles of creek and river while the chill of melting snow is still in the fresh-swollen streams, half his hopes involve the taking of trout and half the feel of swift water tugging at his legs. But the angler for trout does not have all the spring and summer to himself, for many other fine fish dwell in the lakes and streams of the region, and in at least one of the three states—Wisconsin—the fisheries of sport are reckoned as of greater value than the harvest of commercial fish in the waters of Lake Michigan and Lake Superior.

June sees the invasion of the army of motor campers into the upper lakes region, and throughout the rest of the summer and even until autumn is well advanced, these caravans of motor gypsies move along the flowing highways, seeking rest and recreation—camping by the roadside or in the beautiful state parks, halting for a day to fish, garnering memories of the open road to last until another camping season. They find the rare beauty of the famous Dells of Wisconsin, the great cliffs along the shores of Lake Superior, the world famous sand dunes on the east shore of Lake Michigan and countless other places filled with charm or steeped in the dramatic history of the old Northwest. Or perhaps they leave the cars to strike into the wilderness by canoe, to weave amid the endless waterways along the rushing streams and easy portages followed by the pioneers and traders of a hundred years ago. Others cruise the larger lakes in varied craft and hold water carnivals and similar events on countless surfaces.

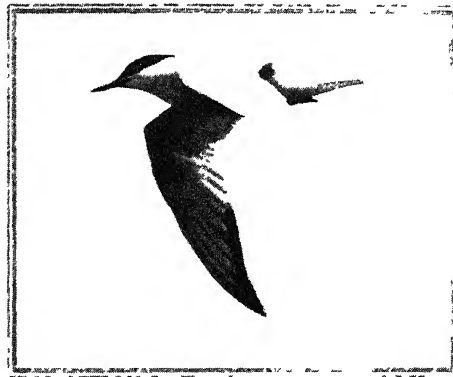
The opportunities the ice-gnomes bring from their northlands—the winter sports—are being rapidly developed in this land so ideally adapted to them. There are lakes and rivers for skating and iceboating, hills for skiing and tobogganing, forests that are white silent fairylands.

A LAND OF TRACKLESS WATERWAYS

All three Lake States can duplicate this river scene, and know the persistent beaver, architect of the wet places, whom persecution has not been able to drive out.

for snowshoeing, drifted highways for sleighrides. Winter carnivals are becoming yearly events in many localities and moonlit winter nights find more and more fire-sides deserted while across the snow-carpeted slopes flit increasing numbers of worshippers of the ice gods.

The flags of France, England and America have flown successively over much of this territory of the upper lakes, and there is rich material throughout the region for those who wish to delve into the proud story of America's yesterday. Père Marquette doubtless stands at the head of the list of illustrious names associated with this country. It was at St. Ignace, on the Straits of Mackinac, that the great Jesuit explorer established

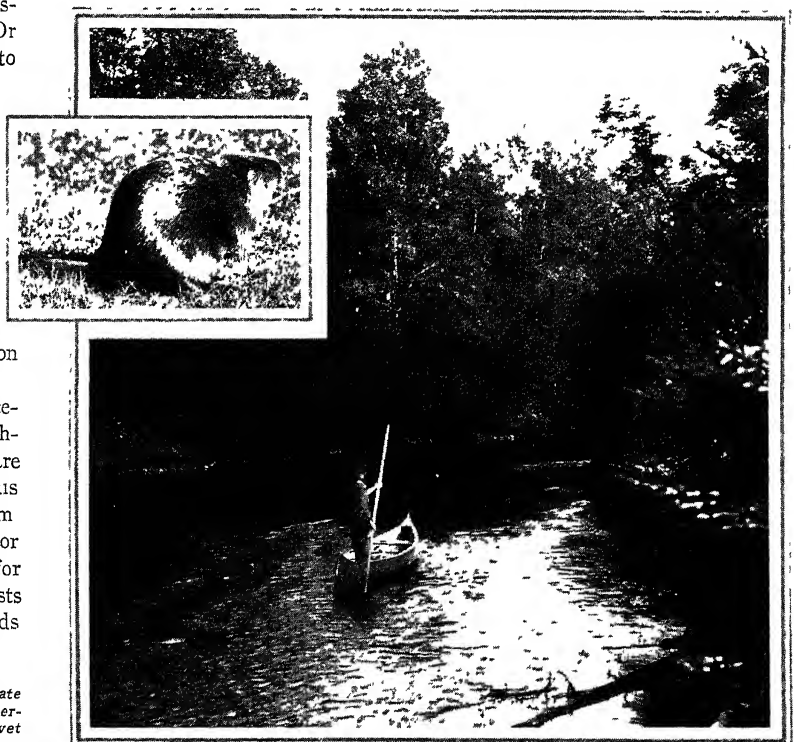


WALTER HASTINGS

A WIDE WANDERER IN FLIGHT

The Caspian tern, winging homeward, represents but one of many species that hover close to the inland seas.

one of his first missions and fittingly it is there he now lies buried, not far from the bronze tablet erected on Mackinac Island in memory of Jean Nicolet, the first white man to pass through the straits, and the first to penetrate Wisconsin. This country saw countless Indian wars between the Chippewa and Dakotas and the Sioux. Settled largely by French fur traders, missionaries and *coureurs de bois*, it witnessed the fierce struggles between the English and the French in the middle of the eighteenth century, and the rise of the American



civilization over Indian and Britisher in the early nineteenth. It took to its bosom the great hordes of immigrants—Germans and Scandinavians mainly—gave them its forests, its farmlands and fur, and later saw them pass in large numbers westward in covered wagons to settle the Great Plains. But as romantic as was its early history, perhaps no other episode in the entire pageant of American development has as much color as the "boom days" when the lumberjack was king and the axe and saw whined rip-roaring accompaniment to the mad melody of falling trees and mushrooming towns. From this heyday has come one of the sterling bits of American folk-lore—the "Paul Bunyan" cycle of legends. He of the mighty axe and "Babe the Blue Ox," who measured "three axe handles and a plug of tobacco between the horns," contains the quintessence of this glowing, living era, which meant so much to young America by furnishing the material upon which she was to build.

They danced in those days, but later generations have to pay the piper, and it is only natural that three states with such recreational possibilities should be forging steadily to the front in forest fire control, reforestation, fish propagation and conservation, the development of state parks and recreational areas, and in many phases of wild life protection. Conservation activities in Michigan are carried on under the Department of Conservation, with headquarters at Lansing. It has proved

itself a powerful factor for the good. There are several sportsmen's associations and a state Audubon Society, with an office at Hart. Minnesota's Department of Conservation, and her Game Conservation league have been largely responsible for the rapid

strides this state is taking. Wisconsin has a conservation commission of six members who control the fish and game, state parks and forests, and whose purpose is to "provide an adequate and flexible system for the protection, development and use of forests, fish and game, lakes, streams, plant life, flowers and other outdoor resources." Public support will enable it to achieve its goal.

In all three states, the Izaak Walton League, with numerous chapters, and many local organizations and individuals are doing their best to stem the tide of destruction that here, as elsewhere, threatens many of our most attractive forms of wild life. It is significant, too, that thirteen dailies in leading Michigan cities, and many in the other two states, are devoting at least one full feature page each week to outdoor sports, recreation, Nature study and conserva-

tion happenings, thus creating a powerful public opinion.

In natural resources, few temperate areas have been blessed more generously than these Lake States. Fur, lumber and fish were the pioneer's for the taking. Yet the first is sadly depleted, though the beaver, whose glossy pelt drew the French voyageurs into this land

(Continued on page 334)



BUTLER

GATHERING A FAMOUS FOOD

An old squaw follows the habit of endless generations when she reaps the wild rice Nature has sown along the lake shores

AMID THE DUNES IN HOEFT STATE PARK, MICHIGAN

The children are not alone in loving these restless acres that marge the Great Lakes. They indicate the versatility of Lake State scenery

F. RODNEY PAINE

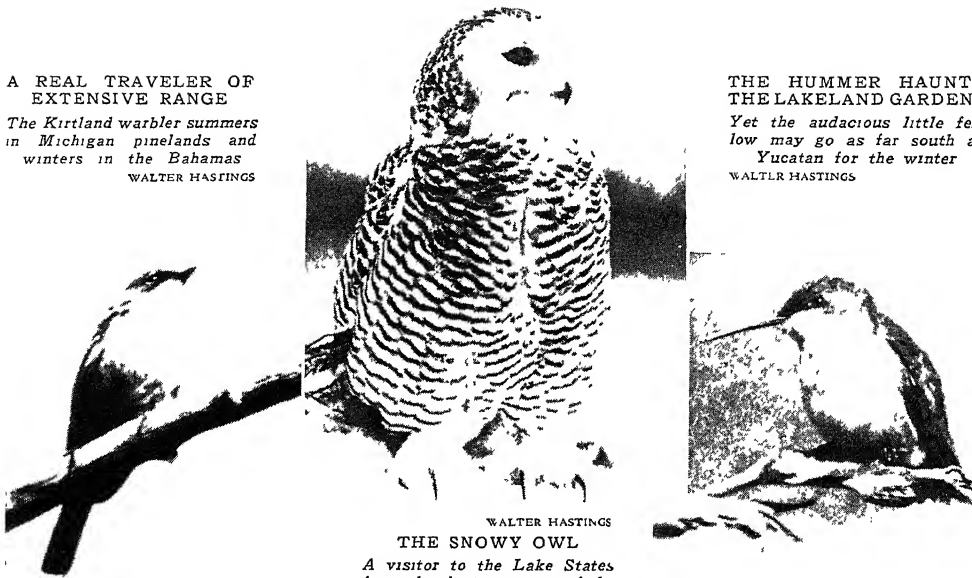


A REAL TRAVELER OF
EXTENSIVE RANGE

*The Kirtland warbler summers
in Michigan pinelands and
winters in the Bahamas*
WALTER HASTINGS

THE HUMMER HAUNTS
THE LAKELAND GARDENS

*Yet the audacious little fel-
low may go as far south as
Yucatan for the winter*
WALTER HASTINGS



WALTER HASTINGS
THE SNOWY OWL

*A visitor to the Lake States
from the Arctic regions of the
north*

BIRDS of HIAWATHA LAND

Here Myriad Migrants Rest on Their Journeys

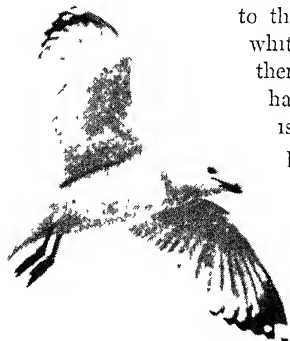
by Edward A. Preble

EVER since the ice relinquished its long dominion over the land of lakes and pines, known as the Upper Lake States, bird life has prospered. Wild fowl fattened in its teeming rice marshes, the wild pigeon millions had here some of their most populous colonies, and some of our finest upland game birds—the wild turkey, the ruffed grouse, the pinnated grouse or prairie chicken, and the sharp-tailed and spruce grouse—formerly abounded. The grassy prairies invited the migrant hordes of plovers to halt their journeys; and the forests gave shelter and sustenance to a wealth of smaller life. What a bright prospect, gay with feathered life,

this land must have presented to the aborigines and to the white pioneers who displaced them. In what manner we have treated this heritage is another, and a darker, picture.

One of the canoe routes of the early trad-

ers passed from Lake Superior to the Red River of the North close to the head waters of the Mississippi River. David Thompson, famous explorer of the Northwest Company, while traversing this chain of lakes late in April, 1798, at the time of the spring migration, has thus recorded his impressions of the bird life: "The country everywhere appeared low and level, something like an immense swamp. Everywhere there was much wild rice, upon which the wild fowl fed, and became very fat and well-tasted, the swan was a very rare bird, and of the different species of geese, only two species of the grey goose, but the ducks [were found] in all their varieties, the cranes and bitterns upon their usual food were equally good, of the plover species there were but few, the ponds having their low banks covered with long grass. In some ponds there were pelicans and cormorants."



HERRING GULLS
*In summer and winter
they soar over the
broad waters of the
Great Lakes*

WALTER HASTINGS

TERN IN FLIGHT
*A wide wanderer, the
common tern raises
its young on sandy
northland islands*

WALTER HASTINGS



Great river and lake valleys form natural highways for migratory birds, and the lake states occupy a strategic position in respect to the vast and rich country to the north. Birds bound for the great nurseries of Hudson Bay and the deltas of the Mackenzie region must pass through this section on their northward journey from the great wintering grounds in the Gulf States. Who can tell when the spring migration actually starts? It really commences when the winter visitors from the Arctic begin to feel once more the resistless urge to return to their real homes in the Northland, and slip away so quietly that only the most careful observations reveal the time of their going. About the same time, as in the East, comes from the South the bluebird, carrying the sky upon its back, as Thoreau expressed it, and telling to his mate in tenderest tones the old story. With him, or not far behind, appears the robin, scarcely less beloved, and soon the earliest sparrows and one or two warblers arrive. The earliest of the ducks and the wild geese follow the line of the retreating ice, and will crowd hard its margin up to the very Arctic. But to most of us, perhaps spring migration means the warblers, those bits of pulsing color that have come from the far South, some even from Brazil and Peru, and will not pause in their flight until they rest in the willows and alders of the sub-arctic. They have followed the starting leaves and opening flowers with their insect visitors all the way from the tropics. With them, but yet apart, are the shorebirds, late from their distant wintering, haunting the borders of grassy pools or margins of streams. Those that nest in the sub-arctic, like the semi-palmated sandpiper, are the first to pass on, but some, those that must wait until the very hem of



A. O. GROSS AND WIS. CON. COMM.

IT MAY BE SAVED

The prairie chicken of the Lake States, a relative of the vanished heath hen, still carries on

vireos, jays, orioles, and others—have each their appointed place. There are birds of prey, also, those checks that Nature has put on the smaller birds and mammals, which without some deterrent force would soon overrun the earth. All these are of interest and delight to millions of residents and visitors. Such southern species as the man-o'-war bird, the wood ibis, and the snowy and little blue herons, wanderers after the close of the breeding season, have been observed here in summer. The beautiful Carolina parakeet, now extinct, was formerly an occasional visitor.

One of the most notable of the small summer birds is Kirtland's warbler. The first known specimen was taken at sea near the Bahama Islands about the year 1840. In 1851, near Cleveland, Ohio, a second specimen was collected, and from this the species was described. A few others were subsequently taken in various parts of the eastern states, but it was not until 1903, more than fifty

the uttermost northern lands is clear of ice, like the turnstone, sanderling, and golden plover, delay their going even until June. Scarce have they gone when the vanguard of the autumnal flocking comes back, first the non-breeders or those that have lost their nests, and later the young and their parents. Many of these sandpipers pass the time of our winter in the summer of the southern hemisphere, on the pampas of Paraguay and Argentina, and these know no season of cold.

In the meantime a wealth of bird life passes the season of reproduction in this favored land. Many small birds of the Southland find their northernmost homes in the low valleys of the Mississippi drainage. Birds of many groups—warblers, sparrows, flycatchers,



ALFRED O. GROSS

A WOOD PEWEE

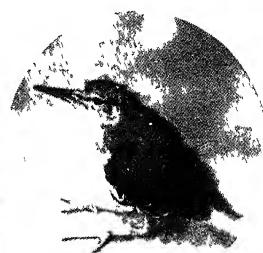
On the limb of some forest monarch she fashions her lichen-shrouded cradle

OUT FOR A STROLL

The ruffed grouse grows snowshoes in the winter and knows how to use them



TEN THOUSAND LAKES—GREATER MINN. ASS'N



ALFRED O. GROSS

NEARLY READY TO FLY AND MAKE HIS OWN LIVING

A spotted sandpiper, denizen of Lake States shorelines, rests from his beach-combing activities to pose calmly for a portrait



ALFRED O. GROSS

THE HERMIT THRUSH

One of the sweetest of the lakeland singers, it favors the quiet piney woods



WALTER HASTINGS

A LAKE STATES VISITOR

This greater yellowlegs pauses on his way to subarctic marshes



ALFRED O. GROSS

NO END OF CLAMOR

A cedar-bird mother with such a family knows few idle moments in her life

years after the bird was discovered, that its nesting grounds were found to be in the pine woods of northern Michigan, and its winter home in the Bahamas. Another bird worthy of special notice is the evening grosbeak. Though it was first discovered near Sault Ste. Marie, Michigan, by the explorer and ethnologist Schoolcraft, in 1823, the birds that were occasionally seen in this region were supposed to be only winter visitors from the Rocky Mountain region. A few years ago, however, it was found to be a rather frequent breeder in the pine woods of the Upper Peninsula. The bird occasionally comes east to eastern Canada and New England, and has been seen as far south as Iowa, Kentucky, Indiana, and the District of Columbia.

In August and September most of the small migratory birds come back from the North with their young, and with those that have bred in this section leave for their respective winter homes in the southern states or the tropics. Then comes the winter, the season of hunger and stress. All but the hardiest of the small birds, those that can subsist on seeds or dormant insects, move south, but the chickadees, nuthatches, woodpeckers, and some others whose food habits permit, stay and brave the cold. From the North come the golden-crowned kinglets of the pines, the redpolls that seem never to tire of searching out the tiny seeds of the birches, and those birds of the level places, the snow bunting or snowflake, always in tireless flocks that sweep from field to field in search of a weed-patch not yet ravaged, and its cousin of similar tastes, the Lapland longspur. These lovers of the waste lands usually grow fat on the seeds of noxious

weeds, fare that man can most easily spare. Occasionally a blizzard of unusual severity proves too much for even their hardy blood, and they perish by thousands. Sometimes violent storms overtake the small bird migrants crossing Lake Michigan or Lake Huron and sweep to their death many thousands, perhaps millions. Remembrance of such tragedies should make it doubly incumbent upon man to protect his wild friends and allies.

Many larger birds also visit the western lake states in winter. Among them may be mentioned the American and king eiders, and several other hardy ducks—golden-eyes, scaups, and scoters—which, with the oldsquaw, frequent the open waters of the Great Lakes. The glaucous gulls, with some of the herring gulls, and the common and red-throated loons, are also found wherever the lakes remain open. The beautiful snowy owl, when forced south by the scarcity of lemmings and hares in its Arctic hunting grounds, may become common. At such times come also the northern form of the great horned owl, and sometimes the hawk owl and the great gray owl. The goshawk is even more frequent, and when it comes may ravage the grouse, and mayhap the domestic fowls of the farmer. Thus does Nature round out her year.

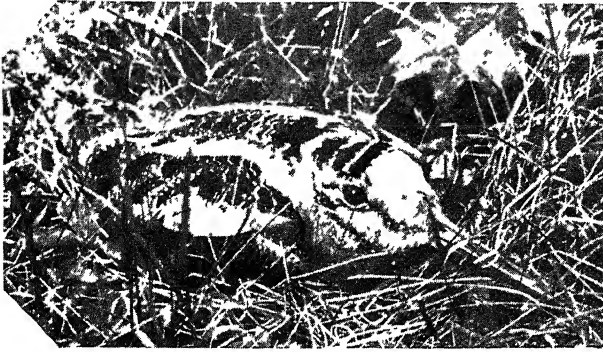
The returns from banded birds show that many of

IN FLIGHT ABOUT ISLE ROYALE
Here in northern Michigan the herring gulls wheel and scream with none to molest them

WALTER HASTINGS



the birds of the Lake States are far travelers. Herring gulls banded on Lake Michigan have been recovered near the mouth of the St. Lawrence River, in Labrador, Newfoundland, New Brunswick, Nova Scotia, and in central Mexico. A great blue heron from Minnesota was recovered on Gatun Lake, Canal Zone.



MOTHER WOOD- COCK

*She patiently broods
on her quartet of eggs
in a marshy thicket*

ALFRED O. GROSS



AND HER REWARD

*This still damp in-
fant, whose bright
eyes sparkle, is her
pay*

A Caspian tern from Lake Michigan, banded in 1923, was taken the next year in Nova Scotia. This bird must have gone south, wintered at some point unknown, and in spring worked its way north again. Other Caspian terns from the same place went to Colombia, South America, and to Cuba. A band put on a robin in Minnesota was recovered from the southern end of the Mexican tableland, where the bird had gone for the winter.

The Lake States form a sort of focusing point of several great migration routes, and this has resulted in a few instances in the detection of birds of European origin, these presumably individuals that have reached America by way of Iceland and Greenland and have accompanied the southward migrating flocks of our own species. Among such are the curlew sandpiper, the European woodcock, the ruff, and the masked duck.

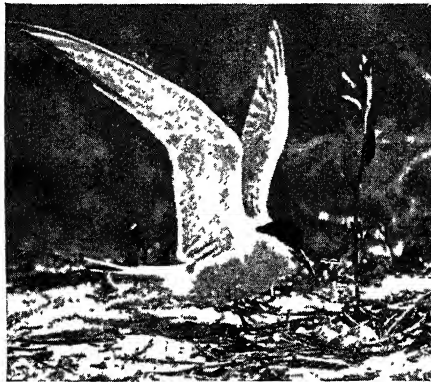
What may one say, in few words, about some of the more notable species of the Lake States? The beautiful passenger pigeon, now extinct, was one of the most abundant of birds. Some of the great nesting areas are thought to have harbored millions, and the birds were slaughtered, especially in these places, by every conceivable method. Often they were fed to hogs, and many thousands were even shipped alive to be shot from traps. Shipments estimated to include a million and a half of birds were sent to market in the summer of 1878. Yet some people still attribute the extinction of the passenger pigeon to disease, or to some unknown catastrophe. On

most eminent authority, Merhshon, however, lays the blame on the net and gun.

There still exist in the Lake States (and formerly they were all abundant), three large birds, each as beautiful and wonderful as the wild pigeon. These are the woodcock, the pinnated grouse or prairie chicken, and the ruffed grouse. They are all birds that have been designated as game, and as such, each is in grave danger. Formerly very abundant, the woodcock is considered by many to be rapidly declining in numbers in the Mississippi valley, and to a lesser extent throughout its range. Its decline in the Middle West is probably due to excessive shooting in Louisiana and other southern states, where it winters. Let us glance at the history of the legislation in force

in its favor during the past ten years. In Michigan, the woodcock has had an annual open season ranging as follows. Nearly two months in 1920, reduced to five weeks, 1921-1924, further reduced to one week, 1925-1928; but increased to about two weeks in 1929. Minnesota, believing either that it had more woodcock,

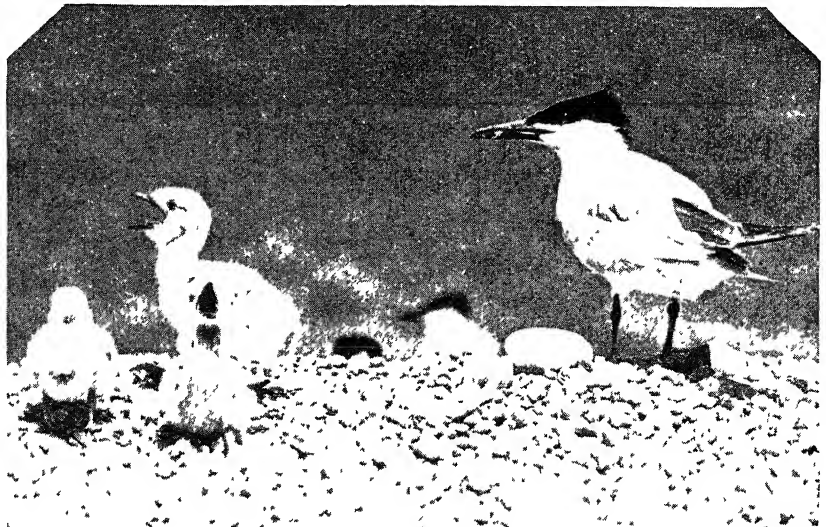
(Continued on page 334)



WALTER HASTINGS

BACK TO HER EGGS

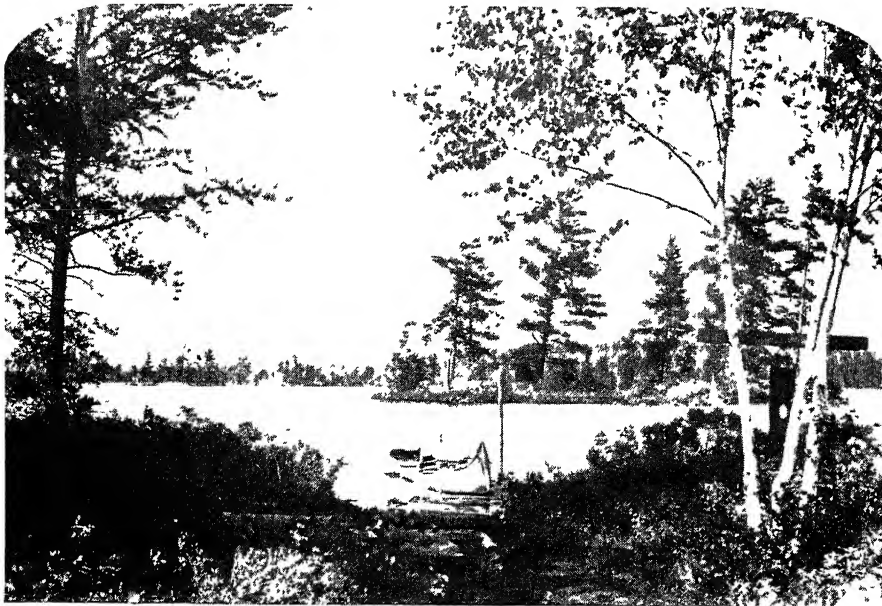
The beautiful common tern gives a final stretch to her wings before settling down to brood



CASPIAN TERNS

These youngsters, whose family ranges far, greet the rising sun from some Lake States shore

WALTER HASTINGS



WHERE PEACE AND BEAUTY REIGN
*Lake Susan, one of Minnesota's ten thousand lakes offers
 the camper his heart's desire*

MINN. ARROWHEAD ASSOCIATION

LAND of the SKY-BLUE WATER

Measuring the Charm of Twenty Thousand Lakes

by Alfred D. Stedman

ONCE I watched evening steal upon a favorite corner of the lake country of Northern Wisconsin from a lovely pine-sheltered shore

Twilight lingered, as if loath to depart, prolonging the witchery of transition from day to night. Quiet possessed the world. Born of the light zephyrs that followed the rougher breezes of the day, gentle ripples provided myriad mirrors for the tints of fading day. The sun's last rays, gilding the fleecy clouds overhead, the illumined pale green tops of trees on the hill that crowned a distant shore, the purple velvety gloom gathering about my shaded cloister—all these things were reflected in a limpid blend of infinitely changing and slowly darkening colors.



MICH. DEPT. OF CONSERVATION

CHAPEL ROCKS ON SUPERIOR
*Part of the famous Pictured Rocks of
 which Michigan can boast*

My lovely little body of water, a mere widening of a stream, was not blessed with a name. It joined, however, to a parent called Little Yellow Lake, a round pearl in a green hill setting, and beyond that, a low shelf of sand sparsely covered with trees and pierced by the river formed the only barrier to Big Yellow Lake. And farther on

"Farther on!" That is the hymn of the lake country, just as it was the hymn of the missionaries and the voyageurs who saw it when it still was virgin. Farther on—what new and more lovely waterscape? Beyond the next portage, around the next turn, what pools or falls or rapids?

My Yellow Lakes are no oases in an arid land. They are merely one series among

ON THE TRAIL OF THE MOON

Countless numbers here seek the health and rest that quiet waters bring

DULUTH CHAMBER OF COMMERCE



is Minnesota, the state of Ten Thousand Lakes, the land of "sky-tinted water," as the Dakota language named it. It is not strange that these three states are called the lake states. Perhaps they might better be called the birthplace of waters, for they father the Father of Waters himself when he is but a trickle, and feed the sources of two other great river systems, the St. Lawrence and the Red River of the North, feeders for the Atlantic and Hudson Bay.

Those who now camp on the piney shores, seeking in these quiet places rest for nerves frayed by the turmoil of modern high speed living, are enjoying a gift of the glaciers of long ago. The slow and stately southward march of these mighty ice masses sculptured the face of Nature into new and untold formations. Their tremendous power planed down hills, excavated valleys and, damming rivers, turned their courses this way and that, first toward one sea and then to another, as a boy traces new outlets from puddles with his toe. The glaciers melted and retreated, leaving the hollows of their making filled with water, and the northward march of vegetation was resumed until the country was again abloom. Thus for tens of thousands of years the forces of Nature worked, draining some lakes, filling others, creating new rivers, touching up the face of creation with verdure. As at the junctures of the St. Croix and Chippewa rivers with the Mississippi, where Lakes

St. Croix and Pepin were created, streams sometimes dammed one another with their silt and extended the lake region beyond the glaciated country, working and reworking this land of the sky-blue water.

On all sides of them, in every direction, lie more and still more lakes, draining into distant rivers, more rugged shores, other waved-marked beaches. Northward a few miles, matchless Superior lures with the glamor of mighty waters, as it lured French explorers a hundred years ago, and around her southern shores cuddle the innumerable lakes of northern Wisconsin. To the East lies Michigan, bisected by water into two peninsulas, with two thousand miles of lake shore and uncounted waters in the interior. Westward

In all three states the shore lines of vanished inland seas are visible. Close by the deepest and largest bodies of water are dry bottoms, muskeg swamps and meadows, marking the steps by which ancient lakes were caused to disappear. And the processions of tamarack, spruce and cedar can be seen encroaching slowly on still vigorous waters, taking possession they will never relinquish as decaying vegetation in the shallows provides a foothold for their roots.

For there is nothing eternally changeless about this country. It is far from static, as are the prairies that still sleep as they have slept for immeasurable aeons. It has no affinity to the seas, which are old in the age of



Now for the portage. One can travel for thousands of miles in canoe, with but short carries now and then.

NOW FOR THE PORTAGE

One can travel for thousands of miles in canoe, with but short carries now and then

DULUTH CHAMBER OF COMMERCE

WHY PEOPLE GO TO MINNESOTA

*Lac La Croix, island-studded, is a favorite
retreat of camper and canoeist*

MINNESOTA ARROWHEAD ASSOCIATION

the world Upon the surface of this undulating region are inscribed everywhere the evidences that Nature's story is in the telling and has not yet all been told, and never may be, until another ice-age comes

Claiming ten thousand lakes and having more than five thousand of sufficient size to appear on the official maps, Minnesota leads all other states in expanse of water area Its lake and river surface totals 3,824 square miles Red Lake, with an area of nearly five hundred square miles is largest, followed by Leech and Cass

Wisconsin's finest lake regions are three, in the northwest, northeast and southeast sections The whole eastern part is well watered and northern Wisconsin alone has two thousand lakes Green Lake, Winnebago and the Four Lakes of Madison are among the most famous

Few places in the world have so large a share of lake surface as the Upper Peninsula of Michigan. Bordered by four of the five Great Lakes, Michigan has in proportion to area the greatest extent of water boundary line of any state Among the hundreds of fine lakes resting in its rugged country are Michigamme, Gogebic and Manistique The inland water area of Michigan totals more than five hundred square miles, while that of Wisconsin is eight hundred and ten

When Allouez, Marquette and Sieur du Luth beheld the hills richly garmented in forests and waters abounding in game and fish, they understood why the Indians had fought among themselves for possession of the country, why the Chippewa and Sioux had waged their endless warfare

The Sioux was lord of the region when the white men came The water courses were his highways The whole territory was a network of ancient canoe trails The explorers and *coureurs de bois* soon learned that the headwaters of a river or the end of a lake was not the terminus of a route, but merely the beginning of a portage to a nearby stream

With net and spear the redman took muskellunge and trout that still lure the sportsmen with line and rod He crept up on the moose, feeding among the lilies In the rice beds over the muskeg, he shot down waterfowl with bow and arrow

The lakes he invested

WHAT MORE THAN THIS?

A lake, and trees, and rolling hills curling up beyond

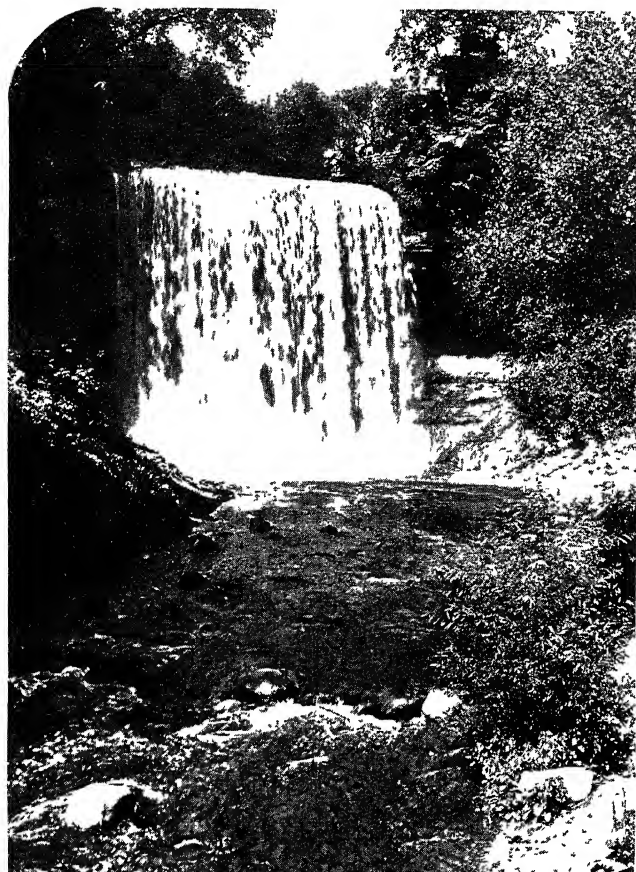
A. E. YOUNG



with mysterious attributes Sensing life pulsing in them and about them, the Indian consulted the poesy of his soul He brooded upon the circumstance that the lakes sometimes seemed obsessed He noted that the winds, passing over their bosoms, awakened in them untamed and malicious passions But the smiles of heaven also were reflected Their movements under gentle breezes sounded to the aborigine like laughter and sweet music. They echoed the moody voices of the night So to him the lakes became the dwelling places of spirits He wove about them a fabric of legend and gave them names as

(Continued on page 335)





MINNEAPOLIS CIVIC & COMMERCE ASS'N

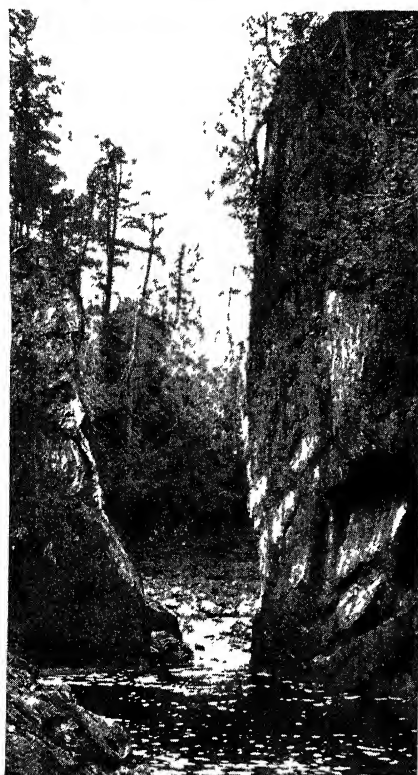
(Left) Where the lovely Minnehaha Falls, most famous of Minnesota's laughing waters, tumble and leap into the valley below

TEN THOUSAND
LAKES—GREATER
MINNESOTA ASS'N

Lake State mammal contrasts—a chipmunk poses on an antler shed by a mighty moose
Below, Père Marquette gazes out over Lake Superior from his bluff near Marquette, Michigan



C. A. HYER

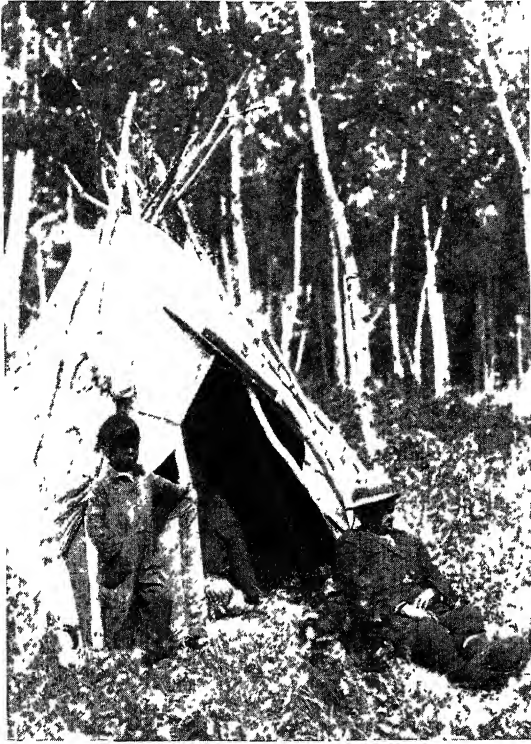


BUTLER

(Below) Two types of Wisconsin scenery—a quiet, sunlit dell, at the left, and the rugged stretches of crag, water and forest embraced by the famous Devil's Lake State Park



F. RODNEY PAINE



(Left) Indians find amid the timber of the Superior National Forest, in Minnesota, a remnant of the wild life of former days

F. RODNEY PAINE



(Right) The North Star State also harbors the lordly moose, as this evening scene in the Arrowhead country testifies

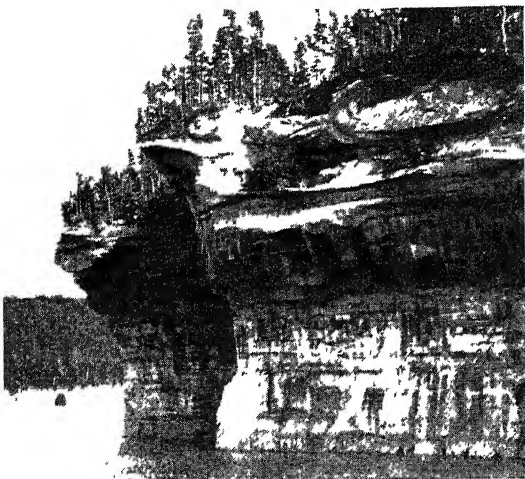
DULUTH CHAMBER OF COMMERCE



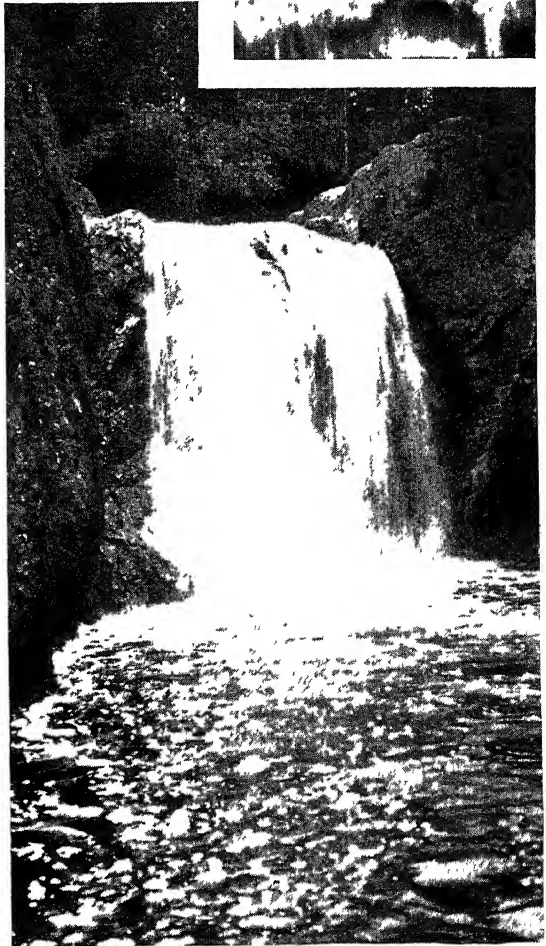
(Left) Not scared but wobbly is this little fawn who represents the most popular mammal family in the Lake States

WIS CON COMM AND A O GROSS

(Below) The beautifully sculptured Pictured Rocks of Michigan rise from Superior's clear waters in graceful majesty



BEN EAST



BUTLER



TEN THOUSAND LAKES—GREATER MINNESOTA ASS'N

MAMMALS of The New Day of Conservation Heralds Their Increase

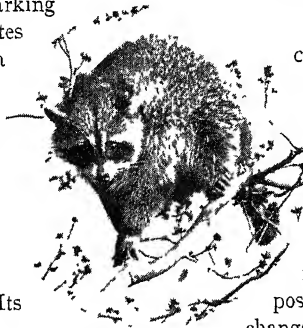


WALTER HASTINGS

THE FAVORITE AND THE SHUNNED
The white-tailed deer is the most popular Lake States mammal, but the skunk has few real friends

THE Upper Lakes States, Michigan, Wisconsin, and Minnesota comprise an area of seven hundred miles in width and five hundred miles in length, encompassing one of the Great Lakes, marking on their shore lines the entire United States boundaries of two others and a part of a fourth, and containing in addition the upper reaches of the Mississippi Valley. The land is one moulded by glaciers, lined and dotted with moraines and embracing more than twenty thousand lakes which recorded the ice sheet's passing.

So varied a land might well, and does, possess a diversified flora and fauna. Its



HASTINGS

UP A TREE FOR FAIR IS THIS 'COON
But only temporarily. Below the bob-cat advises that the photographer beat a retreat.



WALTER HASTINGS

contrasts are more understandable when one considers that the southern parts of these states are partially within the upper Austral, their middle lands in the Transition, and the northern areas in the Canadian life zones. Upon the widely divergent topographical, geographical, and climatic features of these states have been imposed the floral and subsequent faunal changes brought about by the intensive settling and industrialization of large areas, and so in sketching the natural features or resources of these states one is conscious of two pictures. The first presents the primeval condition of several centuries ago, when a balanced, co-ordinated floral and faunal life existed, the other is that of the disorganized landscape brought about by wholesale deforestation, agricultural development, and the advent of manufacturing industries. And yet, there is still a third picture, possibly the most stable of the three, which is now forming, taking on life and color amidst the geometrical pattern of prosperous farmlands and the once charred and blackened "plains" of the north country, where for years the axe bit deep and fire bit deeper. The Artist at work on this third picture is a quiet but powerful influence. Men call it Conservation. The Prophets would have called it Wisdom. The student of ecology will find much to interest him and to test his genius in the faunal changes which have followed the forest harvest-holocaust. The great pines no longer strum to the urge of Superior's winds.

the LAKE STATES

by Edward Allan Hyer

Michigan Department of Conservation



THE ELK IS WELL PROTECTED
Which cannot be said of the digger of
burrows, the woodchuck

nor shower glistening beads of water, fog-born, to the mossy cushion below. Nature is experimenting in this land, never idle, never asking yet never refusing help, she is seeding, and she stocks with what is nearest at hand, healing always.

The mammals of this region range in size from the lordly moose with antlers "as wide as Hiawatha's bow" to the smallest of earth's warm-blooded creatures, the shrews.

He of the prehensile tail, the only one north of the Rio Grande and our only marsupial, the opossum, finds the northern limits of his range in southern Wisconsin and Michigan. Of late he seems to have gained a stronger hold in the farm lands of the lower tier of counties in southern Michigan.

The American bison formerly ranged over the prairie areas of southern Michigan, southern and central Wisconsin and western Minnesota. But as it passed, so passed the prong-horned antelope, formerly denizen of southwestern Minnesota, and the great herds of the American elk, which once roamed the length and breadth of this territory and is still native to a small area surrounding the Manitoba-Ontario-Minnesota boundary lines. The antelope never came back, but the wapiti was re-introduced into the northern part of the lower peninsula of Michigan in 1917 and seems to thrive. The



B. L. BROWN

present herd, numbering approximately one hundred animals, has the freedom of the Pigeon River State Forest in Otsego, Cheboygan, and Montmorency counties, where full legal protection is afforded it. The fact that a part of this forest is set aside as a game refuge, constantly patrolled, in which no hunting is allowed at any time, has doubtless had much to do with the increase of this animal in Michigan.

The woodland caribou, in the days of the timber, roamed from northern Minnesota eastward along Superior's shore line through Wisconsin and the upper peninsula of Michigan, and possibly on the islands in northern Lake Michigan. Today a remnant may still be found sparingly in northern Minnesota.



WALTER HASTINGS

"THAT FOR ALL OF YOU"
The black bear registers contempt. In the Lake States, the opossum, below, finds his northernmost range.

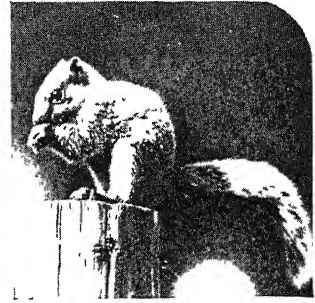


WALTER HASTINGS



WALTER HASTINGS
THIRTEEN-LINED SPERMOPHILE
Native of southern Minnesota and Wisconsin

THE CRAFTY PLAINS YELPER
In the ascendant numerically is the coyote in the Lake States



WALTER HASTINGS
"ANY NUT WILL DO FOR ME"
Chatters the fox squirrel of the southern sections of the land o' lakes. He is but one of the many hundreds of interesting smaller mammals making their home in the forests of this section

There is one animal, however, that despite farm, factory, and open season has managed to hold its own over much of this territory and is today the most common of the larger mammals found there. This is the white-tailed deer. True, it has been driven from the southern and thickly-settled parts of these states, but wherever given protection—and of late years many of the central and southern counties have offered it sanctuary—it has survived where sufficient summer cover and winter food existed. In certain portions of these states where the "tourist" business has become quite an industry, it enjoys a year round amnesty, and there one may see it scampering from the roadside at the approach of an automobile.

Isle Royale, an isolated island in northern Lake Superior, devoid of human inhabitants during the winter months, is the home of a large moose herd, numbering probably two thousand. This spot constitutes the most thickly moose-populated area in the world and long protection has increased this herd to numbers that must soon tax the capacities of the island. Formerly the moose ranged the forested areas of the northern parts of the three states, and even today it browses among the willow groves and lily pads along northeastern Minnesota and sometimes northeastern Wisconsin lakes and streams. Scattered localities in the upper peninsula of Michigan boast, too, of its presence. A decided migration from Ontario seems to be taking place westward across the St. Mary's River into the eastern part of Michigan's upper peninsula.

Eighteen carnivorous mammals were native to the Upper Lake States territory. The puma went west, the wolverene, largest member of the weasel family, is no longer found in the eastern part of this region and rarely if at all in the western, and the long-legged Canada lynx has passed, or is passing, before the trap-

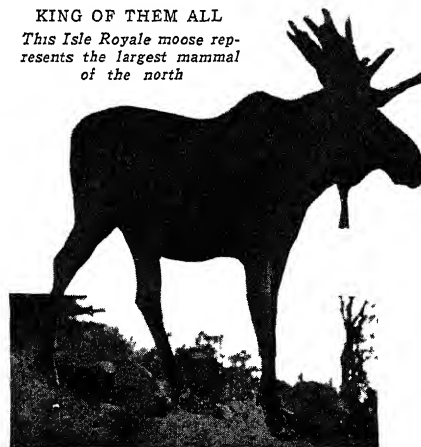
per. The only prominent member of the cat family to remain is the persistent bobcat, which formerly sought its bird and mammal prey over the entire range, but is now restricted to the less settled areas particularly in the northern portions.

Despite traps and guns, the gray or timber wolf, that once stalked the streets of frontier towns on winter nights, and dragged down the enfeebled buffalo on the plains, still persists in the hinterlands where roads are few and travel infrequent, and his lesser relative of the open spaces, the crafty coyote, is actually on the ascent numerically of late years. With the passing of the timber, the "plains" which took its place seem to afford excellent cover for the yelper and his brood. The third member of the family, the red fox, he of the bushy tail and valuable fur, has also so successfully pitted his cunning against civilization as to remain fairly numerous over the northern parts of the three states, and even in the central and southern areas. A southern cousin, the gray fox, hunts over the lower section, but is quite rare. That well-known quadruped, the black bear, one of the shyest of animals in this region, is abundant in the northern portions, although few see him.

The fate of the furbearers has been fraught with tragedy throughout Minnesota, Wisconsin and Michigan. First the Indians, then the *coureurs de bois*, then the settlers, eking out a slim existence, demanded their toll of wild life, and before they had finished, the marten, fisher, and others had virtually disappeared. The silken-furred otter, however, while rare, still occurs in all suitable localities, and the courageous mink and weasel manage to hold out against every change. Bonaparte's weasel, found mainly in the northern sections, and the larger species, *Mustela novaboracensis* in the southern areas, are helping to rid the

(Continued on page 340)

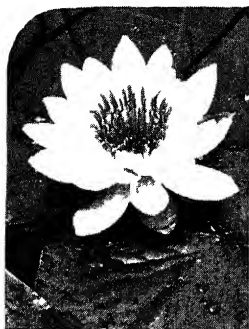
KING OF THEM ALL
This Isle Royale moose represents the largest mammal of the north



WALTER HASTINGS

THE WATER LILY GRACES
THE PONDS

It is quite common over the entire region along the margins of shallow lakes



WALTER HASTINGS



L. W. BROWNELL

(Left) FRINGED GENTIAN
OF THE FALL

It is rapidly growing more rare. The long-fruited anemone, below, is equally demure



JACK VAN COEVERING

WILDINGS OF THE LAND OF LAKES

They Add their Quota to the Northland's Charms

By Arthur Monrad Johnson

University of California at Los Angeles

THE FLORA of the Great Lakes region differs little in its larger aspects from that of New England, the North-Atlantic states, and the St. Lawrence Basin. Certain plants reach here their most northerly and westerly limits, such as the papaw, *Asimina triloba*, the tulip tree, *Liriodendron tulipifera*, and the May apple or mandrake, *Podophyllum peltatum*. On the sand dunes of Lake Michigan are certain relict elements of the Atlantic coastal plain, and on rocky promontories and in cold bogs and swamps, certain rare boreal forms persist. Some far western elements appear to have been isolated here and there,—among the

strangest of which is the devil's club, *Echinopanax horridum*, a very prickly shrub found on Isle Royale in Lake Superior hundreds of miles from its western home. In the deep forests bordering Lake Superior, from



JACK VAN COEVERING

CACTUS OF MICHIGAN

The dry places of the Wolverine State know this plant as well as do the Western plains

Michigan to Minnesota and western Ontario, one will find the showy-flowered salmon berry, *Rubus parviflorus*, whose typical habitat is in the mountain forests of the far West. Here and there occurs the Arctic black crowberry, *Empetrum nigrum*, and in peat bogs and low deep woods the Arctic dewberry, *Rubus arcticus*, is fairly common. These few examples will illustrate the wide variety of the Lake States' wealth in floral adornment.

In many outlying localities, safe from the honking intruder, lovely and rare flowers are still peisisting, but one trembles for their fate. Shall we learn in time that forty acres of tamarack and spruce swamp adjoining a city may be more valuable for what it contains than if it were subdivided for development purposes? Is a corner grocery of more value in stimulating love of country than green spruces, rare orchids, and decoying pitcher plants?

There is little left now of the virgin prairie with its gay seasonal bloom. Yet many of the wild flowers that once carpeted it in profusion still maintain themselves, more or less precariously, on railway rights of way, along roadsides and fence rows, and in scattering pastures. The hairy-coated pasque-flower, *Anemone patens*, opens its large purplish flowers each spring, as vigorous as ever, on many a grassy knoll, and the beautiful prairie violet, *Viola pedatifida*, with leaves shaped into thin segments, is not far behind. May brings the modest star-grass, one of the few native cousins of the amaryllis that were it not for its yellow star-shaped flowers, its presence would not be suspected. One or two of the blue-eyed grasses may be found here at the same time. These, too, have somewhat grass-like leaves, but they claim kinship with the irises, although there is little superficial resemblance to their cousin in their small, bluish



TEN THOUSAND LAKES—GREATER MINNESOTA ASS'N

A BEAUTY OF AUGUST
When it suddenly springs from the rich leaf mold, the Indian pipe is worth a day's journey to see

star-shaped flowers

By haying time the prairies and low hills take on the hues of a richly painted canvas. Red lilies add bright orange-red splashes to the woodland color-scheme. The glowing yellow of the black-eyed susan mingles with the blue of rocketing clusters of blazing stars, *Liatris*, and the deeper, richer blue of the lead plant, *Amorpha canescens*, while with every soft breeze comes the sweet fragrance of the prairie clovers, *Petalostemum purpureum* and *P. candidum*.

The lowly aspen usually has not been held in high esteem, but to

the pioneers of the northwestern prairies it gave shelter and fuel. Nowadays it interests us particularly because it often shelters such choice herbs as the yellow lady-slipper, the orange-flowered puccoon, the aromatic horse-mint, the brilliantly scarlet Indian paint-brush, and the wild geranium. Above them all may often be seen the white spikes of the Culver's root, *Veronica virginica*, and down among the grasses the lousewort, and the slender white clusters of the snake-root, *Polygala polygama*. In the early days this snake-root was gathered by the Chippewa Indians and sold to drug dealers. All the way across country eastward the white wind-flower, *Anemone canadensis*, is abundant, especially along railways and roadsides. In autumn many sunflowers, asters, and goldenrods make colorful hedges along the highways. A little earlier in the season one notes patches of the fragrant dogbanes, *Apocynum*, and



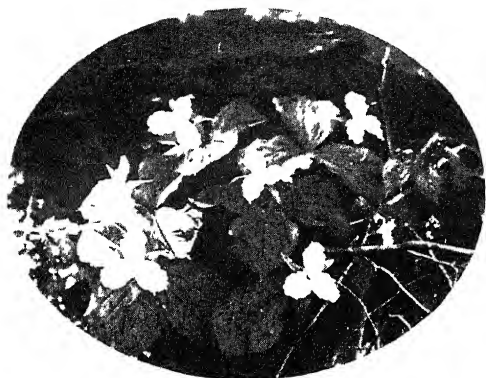
DENIZEN OF THE
DEEPER GLENS
A rare find is the small
purple-fringed orchis

L. W. BROWNELL

AN EXQUISITE
NORTHLAND BLOOM
The American lotus is at
home in the shallow ponds

JACK VAN COEVERING





NESTLING ON THE
WOODLAND CARPET
*Trilliums seek the protection of
a fallen burnt log*

JACK VAN COTTENBERG

CATTAILS OF THE
LOWLAND SWAMPS
*The Lake States know well their
erect forms springing from
marshes*

WALTER HASTINGS



many showy milkweeds, their more robust relatives

The deciduous woodlands are especially rich in wild flowers. To these we go in spring to find trilliums, the dogtooth violet, or trout-lily, *Erythronium*, rue anemone, *Syndesmon*, the false rue-anemone, *Isopyrum biternatum*, hepatica, bloodroot, skunk cabbage, violets—white, blue, and yellow—Jack-in-the-pulpit, and many others familiar to us from our childhood days. Bloodroot and skunk cabbage are two of the first to appear. If we are fortunate we may chance to find, some time in May, the lowly and strange musk-root, *Idoxa moschatellina*, whose kinship no one knows precisely, and which seems to have established itself about the northern hemisphere wherever it finds suitable habitat. Its small greenish flowers suggest a saxifrage while its leaves are somewhat like those of a buttercup. The bellworts, Solomon's seal, twisted-stalk, false Solomon's seal and several species of *Smilax*, are quite common from spring to summer. By this time or a little later we shall find, also, the white- and the red-berried baneberries, *Actaea alba* and *A. rubra*.

In low wet places the marsh marigold, *Caltha palustris*, is usually abundant. To the wealth of showy-flowered herbs should be added the many "flowering" shrubs occurring in these woodlands. Springtime would lose much of its charm were it not for the plums, cherries, service-berries, nanny-haws, hawthorns, *Crataegus*, wild apples, currants and gooseberries, dogwoods, and many others, whose blossoms scent the air and give promise of a rich harvest of luscious fruit. These woodlands hold an enviable reputation for the abundance of their wild fruits and nuts. Nutting, cherry-picking and plum-picking, are occasions

looked forward to with lively anticipation, by both young and old alike.

In the pine regions of Michigan, Minnesota, Wisconsin, and western Ontario, where many people spend their summer vacations, the vegetation is as varied as the topography. A few hours' travel by automobile will unroll a shifting panorama of high rocky hills, sandy plains, deep ravines, dark pine forests, muskegs of spruce and tamarack, and open peat-bogs, deep cedar swamps, lakes and streams, one after the other, each with its distinctive flora. Here grow some of the loveliest of the flowering plants, often far from frequented roads and trails. In order to appreciate fully what this region has to offer in the way of wild flowers, one's observations should begin with the earliest spring and continue until the leaves fall.

Choicest of the early flowers is the trailing arbutus, *Epigaea repens*. Few others of its kin among the heaths can match it for beauty and fragrance. Fortunately for its preservation it is so inconspicuous in summer, trailing beneath the herbage, that it escapes detection. If one sees the blueberry ridges at berrying time, it requires little stretch of the imagination to visualize these favorite heaths at blossom time. But these do not complete the gamut of heaths. A tamarack or spruce swamp, or "muskeg", is a forbidding terrain in summer, giving little hint of the masses of bloom that cover

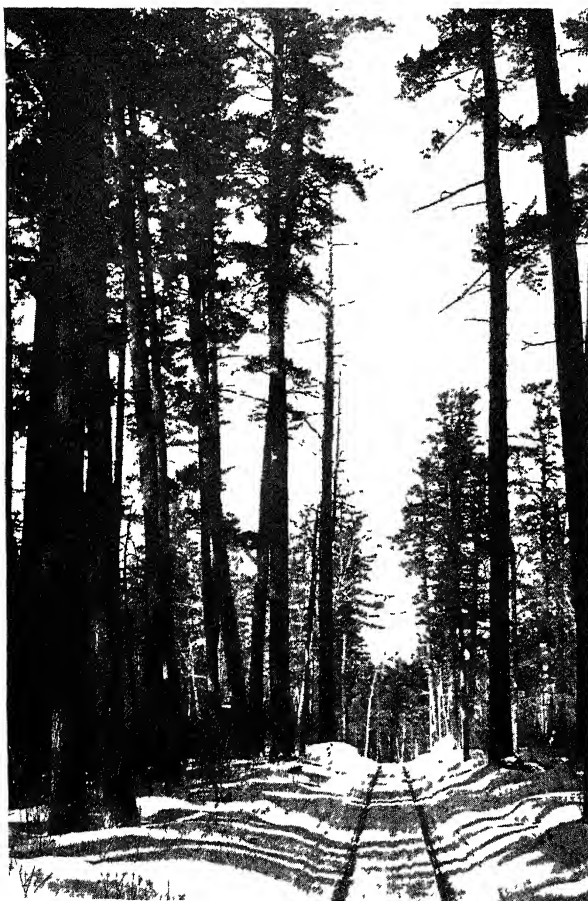
(Continued on page 334)

SHOWY LADY SLIPPER
*No plant of the North has
more subtle charm than
deep wood's lover*



WALTER HASTINGS





A SLENDER ECHO OF THE PAST

A small stand of virgin white pine, near Drummond, Wisconsin, one of the few remaining. It will be cut this year. Michigan has protected several primeval tracts in state parks.

V. P. HOLLIS

WHERE WHITE PINE ONCE WAS KING

now southern Michigan and Wisconsin—by openings or “prairies” of a few hundred acres in extent. It was not all a forest of great, giant trees. Forest fires from natural causes, such as lightning, took their heavy toll even then. In exceptionally dry years blazes started by lightning or Indians would burn over hundreds of thousands of acres, particularly in the Lake Superior region, paving the way for great stands of jack pine. The age of these stands seems to indicate that the last large fire in that region occurred before the permanent advent of the white man, about seventy years ago.

The northern and by far the largest portion of this territory was covered with a forest of pine, spruce, balsam fir, hemlock, white cedar, and tamarack (larch). Amidst this cone-bearing forest, there were also broad belts of hardwoods, of sugar maple, yellow birch, beech, and basswood, interspersed mainly with hemlock and white pine.

The tree that gave character and distinction to the whole northern forest was the white pine. When fully grown, it commonly reached a height of from one hundred and fifty to one hundred and seventy-five feet and a diameter of from four to five feet. The largest trees, known as “cork pine”, grew among the hardwood forest of maple and birch. When the white pine grew among

the hardwoods, it towered high above them. When it grew by itself on the better sandy soils, it formed heavy stands comparable only to the redwood and the Douglas fir forests of the Pacific Coast. Over extensive areas, the white pine stands contained from twenty thousand to sixty thousand board feet to the acre, and single acres are said to have produced as much as one hundred and fifty thousand board feet. Solitary pine trees often scaled from five thousand

Two centuries ago, the territory adjacent to the Great Lakes—the home of the Chippewa, the Menominee, and the Huron Indians—was a vast forest. It was bounded on the east by Lake Huron and by virgin prairie on the west and southwest. Lake Superior fringed it on the north, and in the southeast it merged imperceptibly into the great hardwood forest of the Ohio Valley and the Appalachian Mountains. This region, long spoken of as the Northwest, is the Lake States region of today, embracing the States of Michigan, Wisconsin, and Minnesota.

The forest, originally covering some eighty-five to ninety million acres, or nearly three-fourths of the entire land area, was broken by thousands of large and small lakes, vast open muskegs or swamps, and in its southern extension—what is



MICH. DEPT. OF CONSERVATION

ONE OF THE FEW LEGITIMATE BILLBOARDS

Placed in non-scenic spot, it plays its part in the constructive forestry program of the Lake States.

Lake States' Forests— Lost, Will They Be Regained?

by Raphael Zon

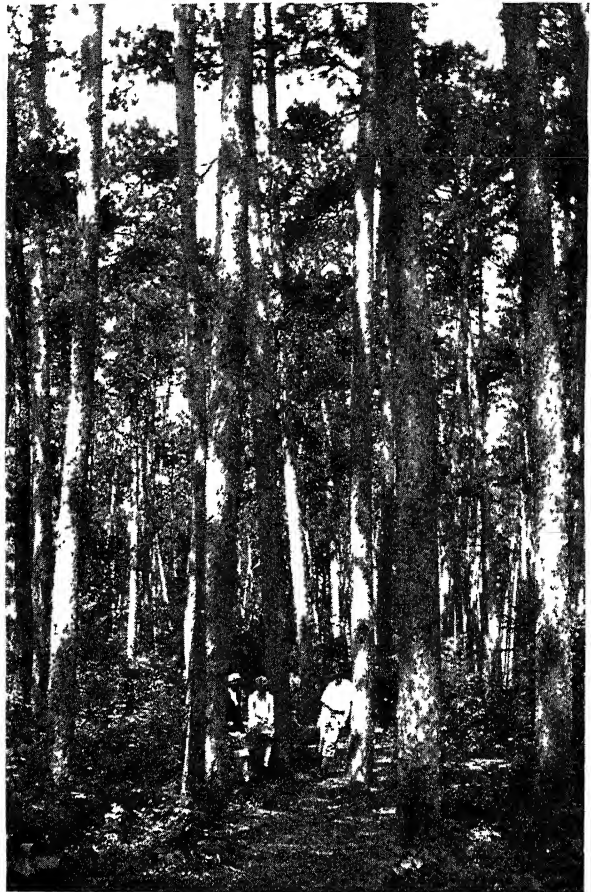
Director Lake States Forest Experiment Station

U S Forest Service

to seven thousand board feet No wonder that this tree was destined to dominate the lumber production of the nation for nearly four decades

The other two pines, characteristic of the region, were the Norway and the jack pine. The Norway pine grew on the light, sandy soils The jack pine was confined to the poorest sand, and, helped by fires, is now occupying much more ground than originally. The lowlands or swamps supported dense forests of black spruce, balsam, white cedar, and tamarack

South of a line that may be roughly drawn from Port Huron to Grand Haven in Michigan, across Lake Michigan to Milwaukee and from there in a northwesterly direction to St Paul, Mille Lacs, and north almost to Red Lake in Minnesota, fringing like a belt the entire territory on the south, was a forest of oaks, white and red, walnut, hickories, and ashes The remnants of this



MINNESOTA ARROWHEAD ASS'N

NORWAY PINE IN MINNESOTA NATIONAL FOREST
Washington Park, Milwaukee, illustrates the way trees help to frame the beauty of Lake States' waters

MILWAUKEE ASS'N OF COMMERCE



hardwood forest are still preserved as woodlots, dotting the farms of southern Michigan, Wisconsin, and Minnesota.

Such was the original forest, evolved through uncounted years under the topography, climate, and soil conditions of the region. It was a forest in which the balance of Nature was not disturbed. The primitive habits and primitive tools of the Indians and early French traders were not strong enough to change the character of the forest. Nature quickly healed the wounds made by the fires. The destiny of this forest was still hidden in the womb of time.

The forest entered its present historic arena with the advent of the early American settlers after the Revolutionary War. These early settlers came not in search for timber. They came to settle on the land, to hew farms out of the woods. The forest appeared to them as a foe—as a wall which stood in the way of

their clearing the land. To convert the rich soil under the forest into farms, they had to carry on an unremitting struggle against the forest, fight timber wolves, wildcats, hungry bears, and hostile Indians. The timber itself had no immediate value, and there was so much of it.

The exploitation of the timber itself did not begin until about 1850. The impetus to the growth of the lumber industry in the Lake States region was given by the rapid settlement of the north central and prairie States, soon after the Civil War. From the north of Europe and from many worn-out New England farms stream after stream of immigrants trekked into the northwestern territory, first in "covered wagons" and later by railroads which stretched across the plains. Cities sprang up like magic.

The settlers needed houses, barns, wagons, and fencing. The people in the cities needed homes, warehouses, sidewalks, chairs and tables, fire-wood, shingles, fuel, and lumber for the manifold purposes of an early civilization built entirely on wood. The white pine forests of the Lake States were the one place from which a seemingly inexhaustible supply of lumber, admirably adapted for building purposes, could be drawn. The period of the great migration of people into the prairie states coincides with the period of the great cutting of the northern pine forests.

Civilized man made a concerted attack upon the forest with an army of fighters. Farmers from the southern parts of the States and from Ohio and Indiana journeyed by the thousands into the pineries to work as loggers. The great mill towns, Saginaw, Au Sable, Escanaba, Marinette, Green Bay, Eau Claire, Minneapolis, and others rose, each crowded with saw-mills. For three decades, between 1870 and 1900, the Lake States were the greatest timber producing region in the country, and the chief output was white pine lumber. By 1900, Michigan and Wisconsin had practically cut out their white pine. Whatever white pine lumber the region has produced since that time came, and still comes, from Minnesota. As the cut of white pine declined, the hardwood lumber industry came into its own. It, too, however, is now practically at an end in lower Michigan. Sufficient supplies of hardwood still remain in the Upper Peninsula and in northeastern Wisconsin to maintain the hardwood industry on a large scale for about two decades. But the region which once occupied the first place in the national output of lumber has now dropped to the fifth rank. Today the timber cut does not meet the needs of the region and lumber is being imported from the outside.

Less than eighty years saw the lumber industry sweep away all but a few remnants of the original eighty-five million acres of forest. Only eighty acres of virgin

white pine and a few thousand acres of the original hardwoods are left in the Lower Peninsula, about five million acres of old hardwoods in the Upper Peninsula and northeastern Wisconsin, and not over one million acres, mostly of Norway pine, in Minnesota.

A sad heritage of millions upon millions of acres of ruined and desolated land was left in the wake of the heyday of lumbering. The sandy pine lands were hit especially hard. The heavier fertile soils which supported hardwoods, particularly in the southern counties, are now in farms. There are found thriving towns and fast-growing industrial centers. But the sandy pine lands and the more rugged and rocky soils of the most northern country proved unsuited to grow corn, wheat or potatoes, or other farm crops in paying quantities. Settlers who tried to cultivate them were starved out. There are in all some twenty million acres of such cut-over land, about ten million in Michigan, six million in Minnesota, and four million in Wisconsin. Approximately one-sixth of the entire land area of the region is in this condition.

Millions of acres of these "cut-overs" are fire-swept and blackened. Millions of acres are covered only with stumps, brake, berry bushes, and patches of inferior forest growth. They are abandoned by their owners, produce no taxable wealth, and retard the development of the local communities. They weigh heavily upon the remaining settlers in the region, the small business man in the town, and every productive enterprise. They threaten with bankruptcy many local communities and are by far the biggest economic problem that the region faces today.

The present generation, when confronted with the melancholy sight of these millions of acres of desolated land, naturally point their finger to past logging as the principal cause for the present situation. In their resentment, they lose historic perspective and forget the contribution which the lumber industry has made to the upbuilding of the region. Who can weigh on the scales of history and tell whether the price paid was too high for raising the region from obscure commonwealths of lowly rank to high position among the leading states of the Union? Who can deny that the region owes much to its virgin forests, and that the country as a whole, too, is indebted to the woods of the Lake States which sent their timber and

their lumber far and wide to help in the building of a growing nation?

It was the lumber industry that in the 70's and 80's drew population to the Lake States because there was plenty of work in the logging camps and at the mills. It caused railroads to be built up and down and across the states. It aided agricultural development by giving farmers markets for their crops. It gave impetus to the general



UPPER PENINSULA DEVELOPMENT BUREAU

THE AFTERMATH OF THE FLAMES

Poplar is among the first to spring up after cutting or fire. It has proved its usefulness.



WHERE GODS OF CARELESSNESS ONCE RULED
Cut-over or burned areas like this comprise one-sixth the area of the Lake States

THE HOPE OF A NEW DAY
Replanted acres in the Huron National Forest, which spell future prosperity
LAKE STATES FOREST
EXPERIMENT STATION



commercial development of the region, for the logging camps and lumber towns needed supplies of many kinds. It had a leading part in furthering the educational and civic advancement of the states, because for a long time it was the principal source of taxation revenue, and is still a source of support for many of the educational institutions of the region.

It left a serious problem, however,—the problem of economic rehabilitation of the millions of acres of cut-over and burned land. New economic forces are at work which point the way toward its solution. First of all, the old idea that the sandy soils of the pineries and the rocky, rough land of the north can be settled by farmers is now dead. Even the most enthusiastic agricultural promoter admits that the only use to which such land can be put is that of growing timber. The present economic trend in agriculture with its shrinking area, concentration on better soils, improved methods of cultivation, and better paying crops, brought a more sober, realistic attitude toward the solution of the cut-over land problem.

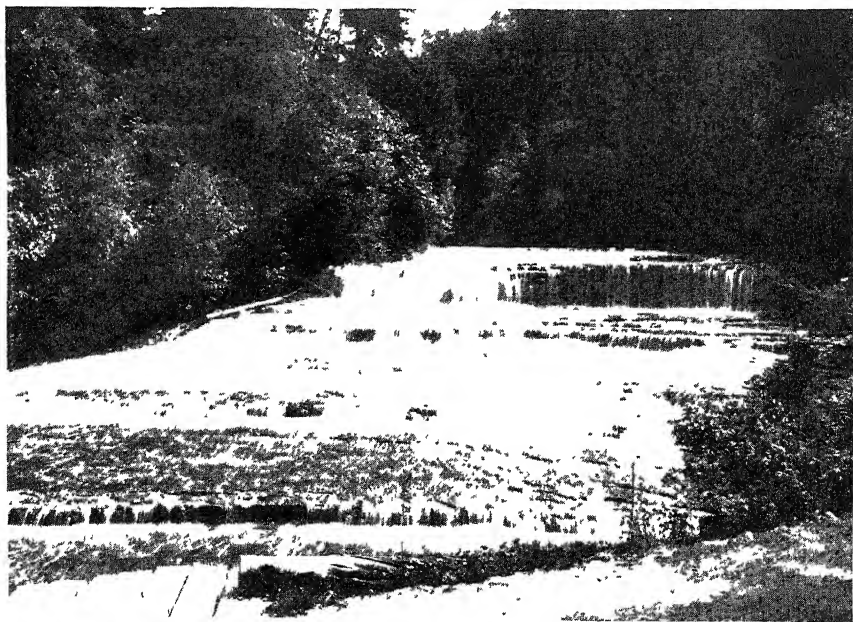
Another factor is the increasing use of trees, such as jack pine and popple (aspen), for pulpwood, box material, and similar uses. Barely a dozen years ago these "poverty woods" had no commercial value. Today, they bring a fair stumpage price, and jack pine is eagerly sought by many pulp and paper plants competing for raw material. They are the trees that first appear after fires, and for this reason occupy much of the land which originally supported white and Norway pine. They reach merchantable sizes in from thirty-five to forty years, and on the better soils may yield as much as from thirty to thirty-five cords of wood. Forest fire protection, which is becoming more effective in the region every year, is bound to benefit these species first of all.

The advent of the automobile, strange as it may seem, is also playing an important rôle in the reclamation of this abandoned land. The automobile brought a new appreciation of the country and created an insistent demand for good roads. These roads have opened to the recreation seekers of the country the region's rich treasury of scenic attractions—its thousands of miles of exterior coast line, its tens of thousands of inland lakes,

its streams, its valleys, its hills, its near-mountains, its woods, and its wilderness. As a result, the recreational industry of the region—an industry that already rivals the once proud lumber industry in profitable returns—is making tremendous strides and has seemingly no limit to its opportunities for expansion, and its backbone of the recreational industry is the forest. Lakes and streams set in a background of blackened, desolate, depressing cut-over shores hold no allure for the tourist, the resorter, the Nature lover. But a lake in a setting of a green forest is a delight to the eye. A stream shaded with trees is a nourishing covert for trout and a restful place for the angler.

This new appreciation of the forest has led to a better understanding of the need for fire protection, for forest planting, for the establishment of county, state, and national forests. Great areas of wilderness are being set aside as outing, fishing, or hunting clubs. In the three states, the area now in state, municipal, and county parks, resorts, clubs, shooting grounds, hunting and fishing preserves, and in state and private game refuges is close

(Continued on page 341)



(Left) Au Trian Falls, near Mumsing, Michigan, is one of the most delightful water-scapes in this land of streams, lakes and rivers

UPPER PENINSULA
DEVELOPMENT
BUREAU

(Below) The state of Wisconsin has set aside for posterity this twining strip of Green Bay shore line by creating Peninsula State Park



(Left) He's up a tree for fair, this prickly denizen of Lake States forests, and woe to him who tries to dislodge him. But after all, porky's looks are worse than his disposition

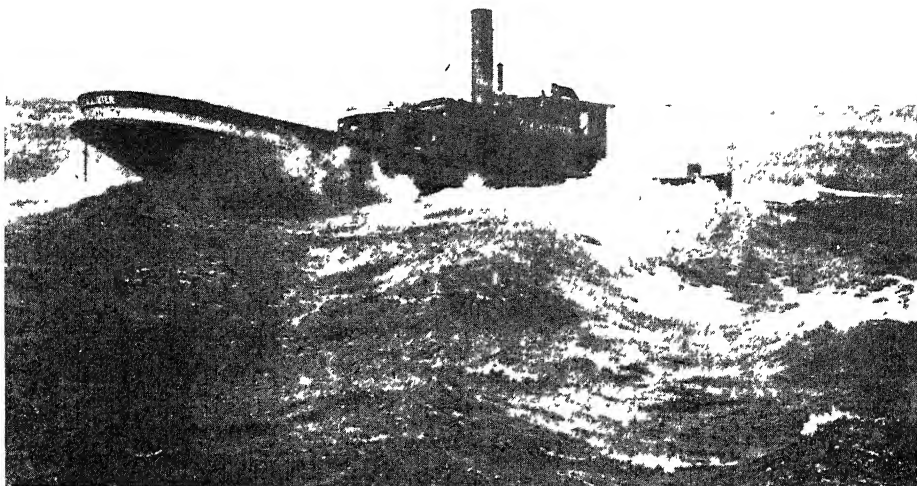
TEN THOUSAND
LAKES—GREATER
MINNESOTA ASS'N



F. RODNEY PAINE

(Left) Just one of the ten thousand lakes of which Minnesota boasts is West Bearskin Lake, in the Superior National Forest, but it exemplifies the beauty of the land of sky-blue water

F. RODNEY PAINE



DIRTY WEATHER DOES NOT STOP THIS FISHING BOAT
*Through storm, fog and cold, the fishing fleet continues to reap its finny
 harvest to supply a continent*

FINS of the INLAND SEAS

Valuable and Varied is the Lake States' Fish Life

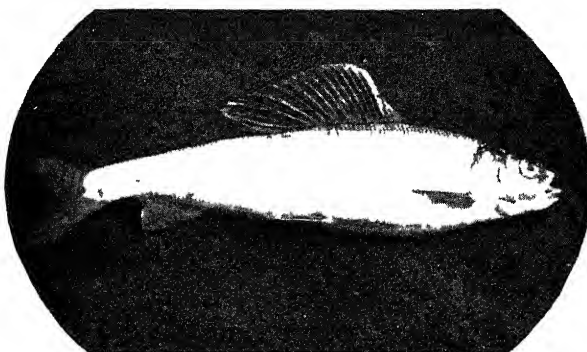
by Walter Koelz

University of Michigan

OUT THROUGH the mist-tortured dawn, in all but the coldest winter season, travels the Lake States fisherman to his favorite grounds, in search of the silvery harvest. Perhaps he goes in a power boat, with miles of nets on the deck, a mere cog in a great scheme to turn the denizens of the depths into money for himself and food for thousands. Or perhaps, a pleasure seeker, he travels in canoe or on foot, equipped solely with a five-ounce rod and the urge to pit the skill of wrist and eye against the strength and courage of the trout. Yet he will probably little realize that his quarry, the thing of a moment to him, exists only because of endless ages of geologic change, that the fish life of the streams and lakes owes its being to the effects of ice and erosion and continental uplifting during time reckoned a thousand thousand years.

For ages the land lay beneath the ocean and layers of great thickness were then deposited upon it. Finally it rose, to start in motion the agencies of erosion, which began to level the crests and sculpture broad river valleys.

THE GRAYLING
*Once he choked Michigan
 streams, he is now little
 more than a memory*



There were then no important lakes, it is believed—the network of water bodies of today is the consequence of developments of the Ice Age, when colossal glaciers descended from the northeast over the entire Great Lakes region, scouring and blocking depressions to form great lake basins. All life was driven before the ice advance, so that there was a time when probably the only fish of this region were those few species that now prefer the colder waters of the north.

Then followed many complicated changes. Rivers opened Duluth, Chicago, Fort Wayne and Syracuse, at one time or another, to the south. Lake Ontario became, for a while, a marine gulf. As the ice withdrew, through the south-flowing streams returned the exiled fish, and when the water became fresh again in Lake Ontario, even relics of the ocean fauna remained.

To these tremendous geological changes the region owes its mingled and abundant fish life. Some one hundred and fifty species are known to come from the Great Lakes, their tributaries and the head waters of the great rivers to the

GAMEST OF ALL
*He was recognized as a
 fighter extraordinary by
 fishermen*



WORKING TO SAVE THE FISH LIFE
Taking spawn from big fish to restock the Great Lakes
This is one of many conservation attempts

South Many other species have been introduced here by man

The chief elements of the fauna that came from the north are the whitefishes, the lake herrings and the trouts, all of them stop far short, in their distribution, of the southernmost advance of the ice, and many are confined to the cold waters of the Great Lakes, even to their icy depths. Certain minnows, the basses, the sunfishes, the catfishes, have returned from the south to territory they once occupied, but the Lake States mark their northernmost advance. In the Lake Ontario region several fish ascended from the ocean or were left behind when the sea last departed, including the eel, the alewife, shad, smelt, salmon and the sea lamprey. Man has successfully introduced the rainbow trout from the west, the carp and brown trout from Europe, and the goldfish from Asia.

The northern fish in the main eat only animal food, live in schools and spawn in the fall, giving no care to their young. The southerners comprise both plant- and animal-eaters. Some live in schools and some singly, but none spawn in the fall and many build elaborate nests and give considerable attention to their offspring. The ancestors of the sea relicts of the Lake Ontario region ascended into fresh water to spawn, and returned to salt water for the rest of the time. Their landlocked descendants no longer return to the ocean, although the eel still migrates thousands of miles to the salt water spawning beds, in far southern waters.

Given so many kinds of animals a great diversity of habit is to be expected. Thus some fish prefer warm water, others can live only in ice water, some want running water, others are happy in stagnant. And so in the region some kind of fish may be looked for wherever there is any water at all. The mud minnow and the three-spined stickleback thrive in the puddle that dries up in the summer drought and the lawyer and the cock-

atoosh find something to their taste even in the nine hundred foot depths of Lake Superior.

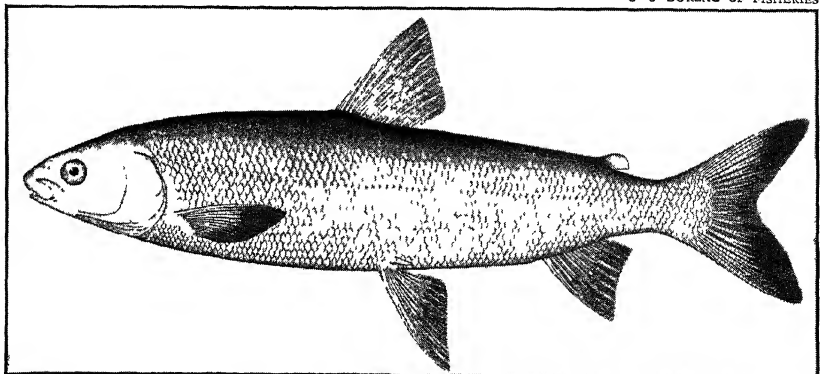
The kind of fish that live in the streams of the region depends on the water temperature. In the southern section the suckers and shiners, including dace, creek chubs, stonerollers and others of the minnow family, are the dominant fish. Fish of these groups are peculiar in having more or less powerful teeth in the throat instead of on the jaws. During the breeding season the males usually take on, in addition to the higher color typical of most breeding fish, horny growths on various parts of the body and fins, thus the sexes at that season do not closely resemble each other. The breeding behavior of many of the species is very elaborate and extensive nesting sites are often prepared. The river chub, for example, a fish not usually over seven or eight inches long, gathers together as a nest a heap of stones, often several pecks. The horned dace digs a hole in the ground, making an elongated mound with the excavated material. Some of the minnows undertake no nest construction, but many pick out a site and drive off trespassers. As with fish in general, the male only keeps watch at the nest, but the vigil is not of long duration and no care is given to the young. These fish for one reason or another are not important for food. The suckers grow large enough, but their flesh is soft and bony. Few of the minnows become of suitable size for eating but are of first importance for fish-bait.

In the north the minnows become fewer in species and in numbers but their place is taken by the brook or speckled trout. In late years rainbow and brown trout have been introduced into these streams. The brook trout feeds on the food that minnows elsewhere eat and on the minnows themselves. The newcomers have the same food habits and often eat the brook trout in addition. The grayling that once was found in the coldest and purest northern streams is now almost extinct.

As streams grow larger, quiet pools are formed in their course and in these another group of fish may be found, those that regularly inhabit the myriads of lakes of the region. Every fisherman of the lakes knows well the sunfish, bluegill, perch, black bass, calico bass, pike and bullhead. He may know too the darters, top-minnows, shiners and miller's thumbs that are also a part of the fish census of the average lake, but more likely he hasn't noticed them or has taken them for fish not

THE MOST FAMOUS FOOD FISH OF THE LAKE STATES
The celebrated whitefish, for which Indian tribes have been named, and which ranks as the tastiest of fresh water denizens

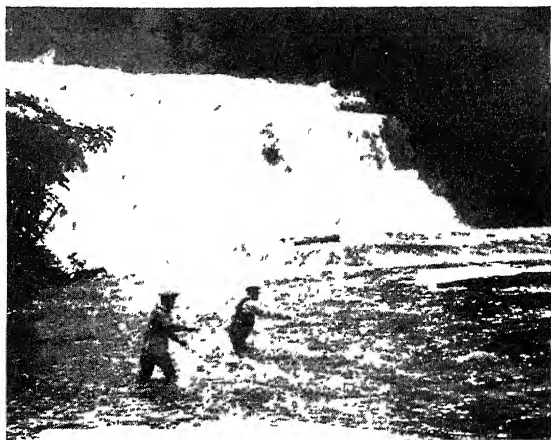
U S BUREAU OF FISHERIES



yet grown up. The pike and black bass challenge the skill of the lake angler, and the sunfish, bullhead and the rest attract his less experienced family.

Nest building and care of the young reach great development in the fish of the lakes. In the case of the sunfish, the black basses, rock bass, crappies and bluegill, the male fish sweeps a hole in the bottom for a nest. This hole is usually two or three times greater in diameter than the length of the maker and contains gravel, shells or rootlets to which the eggs are usually found attached. The male fans these eggs with his tail and keeps guard against robbers, attacking large fish and even intruding turtles.

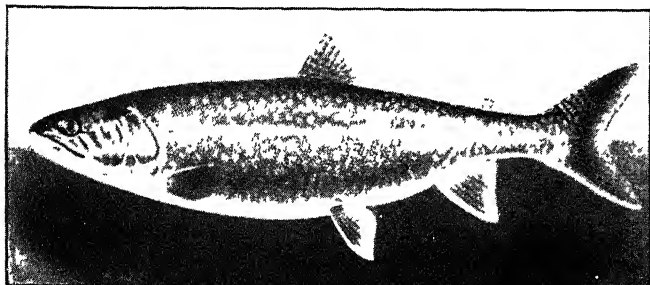
Some fish take considerable pains to get their offspring started in life after they are hatched. The bullhead and dogfish are notably considerate parents and such a father may be found chaperoning a squirming ball of several hundred to several thousand youngsters, each an inch or more long. Such prolonged nursing is



WHERE LIE THE WILY TROUT

BUTLER

Bond Falls, Michigan. Below is the lake trout, a delicacy, yet rapidly dwindling in numbers.



U. S. BUREAU OF FISHERIES

surprising in view of the omnivorous habits of these fish, but the males while domestic have, as a rule, poor appetites. The females on the other hand are not so abstemious and undoubtedly would eat their own eggs.

In general the larger the lake the more kinds of fish it contains, so the Great Lakes have many species, in fact, almost all the fish of the region occur in them. The shallow bays are much like the inland lakes and have the same fish, but the deep expanses are populated by fish that prefer cold water. The lake trout, whitefish, herring, six species of herring-like fish called chubs, and the lawyer or loche are the important elements of this group. All but the chubs may be found in a few large and deep inland lakes, though the herring is the only one that is at all generally distributed in such bodies of water at this latitude. The chubs do not often come into water shallower than one hundred feet and some of them keep always in depths of five hundred to six hundred feet.

All of these, except the lawyer, are relatives of the salmon and are very valuable food fishes. The whitefish has been a favorite from the days of the red man. It has given its name to Indian tribes. Early explorers singled it out for mention because of its dainty flesh, and modern epicures have ranked it first among fresh water fish. The lawyer is a cousin of the ocean cod, but has not the popularity of its famous relative. Other fish do not eat it, nor will the herring gull, unless times are bad, and gulls do not otherwise appear to be finicky. It has lately, however, found a place on the market

For many decades the Great Lakes have supported immensely valuable fisheries. It is estimated that several hundred million pounds have been produced annually for the last fifty years, and more than twelve thousand people now are directly engaged in fishing for the market.

Large steamboats and expensive gear are used in the fishing industry. There are many boats on the lakes that are seventy-five feet long, and require six men to operate. These boats carry their nets sometimes fifty miles from port. The nets thus set are always gill nets, so-called because they stand on the bottom like a tennis net and catch the fish by the gills when they try to pass through the fine meshes. A string of nets five miles long is not an unusual gang, and each boat may have several such gangs in the water at one time.

There are numerous smaller boats that fish along the shores with pound or trap nets. These nets are fixed in water less than seventy-five feet deep, as a rule, and take the fish alive.

A popular method of catching certain species, especially lake trout, involves the use of set lines. A long line is let to the bottom to which are attached at regular intervals a short line bearing a baited hook. A small fish called a bloater is commonly used for bait, its usefulness due to the fact that it fills with gas when brought to the surface and hence when put onto the hook floats, thus keeping the hook above the bottom. Several thousand hooks are employed in a gang and the main line may run for five miles or more.

The fish are generally shipped on ice to the large cities of the lake states and to New York City, and all except the chubs, which are smoked, are sold fresh. In the fall many herring are salted and sold mainly in the southern states.

Fish have been a great factor in the development of the region. As once the wealth of the land lay in its fur, so with the passing of the fur regime came another era with the exploitation of forests, mines, and the Great Lakes fisheries. Attracted by unspoiled fishing,

(Continued on page 342)

Minnesota chose to represent her the delicate moccasin flower, one of the orchid clan, and a dweller of deep glens. No fairer bloom exists in any part of the country

TEN THOUSAND LAKES GREATER MINNESOTA ASS'N



E. L. CRANDALL



E. L. CRANDALL

The violet, whose blue bedecks Wisconsin fields in the spring-time, has been given the place of honor among flowers of the Badger State

Youth among the apple blossoms. They symbolize the deep-fruited orchards for which Michigan is rightly famous

J. C. ALLEN



Michigan and Wisconsin chose the wild rose, winner in the National Referendum, as National Flower, and Minnesota, though preferring the columbine, likewise gave it more votes than its "favorite son" received



UPPER PENINSULA DEVELOPMENT BUREAU
 A ROCK GARDEN OF THE LAKE STATES
This northern borderland, with its rugged climate, has taken enthusiastically to this type of flower growing

GARDENING IN THE NORTHLAND

How the Settlers Preserved Their Heritage of Blooms

by Huron H. Smith

GARDENING in the Northland is no Topsy performance. Plants don't just grow—they must be born of infinite care. Just as the immigrants sweeping into the Lake States during the nineteenth century discovered that life was not to be a lyric poem, so did they discover that they must make careful choice of their plantings to maintain their traditions of beautiful gardens carried across the seas. The sturdy German farmers, the dike-building Hollanders and the rugged Scandinavians populating Wisconsin, Minnesota and Michigan soon found ways of adapting their favorites to the changed conditions of temperature and wind. The Scotch and the English likewise perpetuated, as they settled in this land, the floral victories their forefathers had won, and today, in this Land of Sky-Blue Water, it is almost a truism that a man's race can be told from the front "yard" he keeps.

Perhaps the most interesting gardens of the Northland are those of the aboriginal inhabitants, our first Americans, the Indians, now more numerous in Wisconsin and Minnesota than they were at the time of the

census of 1812. The Ottawa, Ojibway, Menominee, Pottawatomie and Meskwaki represent the forest dwellers, while the Sioux and Winnebago represent the plains Indians. For many centuries before the white man ever saw the United States, these tribesmen worshipped the flowers of the forest, plain and bog. Their religion was largely based upon plants.

Indian flower gardens are usually reminders of what our flower gardens used to be a quarter of a century ago. Plenty of annuals, such as nasturtiums, pinks, morning-glories, balsams, touch-me-nots, cosmos, zinnias and verbenas are to be found. They are in many cases reminiscent of the good old days of congressional free seed packets and we find them still growing *salpiglossis*, *calliopsis*, *gaillardia*, and *coreopsis*, but usually totally ignorant of the names of these posies. Hollyhocks also are favorites. They generally grow but four vines,—Virginia creeper, *Clematis paniculata*, trumpet creeper and hops. The modern Indian is most pleased with variations from these old standbys and now has developed a taste for dahlia, gladiolus and phlox, among others.



MILWAUKEE PUBLIC MUSEUM

BROUGHT OVER BY THE FIRST FAMILIES

Though a prey to pests and disease, the beautiful snowball, favorite of the pioneers, finds a home on many a northland farm or city yard

The character of the early immigrants to Michigan, Wisconsin and Minnesota has had much to do with the beauty of the gardens of the region. Those religious and political exiles from Germany who joined the great immigration of 1848 found in these states a region not differing greatly from their homeland. The *hausfrau* did not forget her garden posies, and in many little hamlets throughout our territory one might easily imagine himself back in quaint old Nuremberg. The practiced eye can find many of these homes in such metropolitan centers as Detroit, Milwaukee and Minneapolis. Old-fashioned gardens, with mignonette and forget-me-not, pansies, larkspurs, hollyhocks, hen-and-chickens and a Christmas cactus or two speak more plainly than words that here is the home of a solid German-American.

The German women settlers of that period had a positive passion for gardens, and kept them attractive at all seasons. Snow-drops and crocuses started the spring, pansies began in a sheltered spot, then went to a circular bed in the front yard to be framed in ice plants. *Iris germanica* in forgotten varieties garlanded the perennial border, in company with bleeding heart, valerian and bachelor buttons. The Germans are still the source of many perennials for transplanting.

About June ten the house plants—begonias of the overblooming and Rex types, unbelievably tall and robust geraniums, sturdy peperomias, variegated coleus, languorous heliotropes, bright forget-me-nots, and finally the big tubs of night-blooming cereus and the dormant oleanders, scarcely ever seen elsewhere,—were brought forth. The summer-flowering garden in the side

yard or rear of the house was a curious collection of utility, curiosity and fragrance. Candytuft, hen-and-chickens, dusty millers and spineless verbenas formed the edge, farther within were white tansy, immortelles, yarrow for their "schafesgarbe-tee", love-lies-a-bleeding, love-in-a-mist, the old Maltese Cross, honesty, monkshod, annual larkspurs, annual phlox, calendulas, marigolds and four-o'clocks. The fence supported southern-wood, and hollyhocks. Morning-glories framed the back porch.

Mignonettes for cutting, silver sage, sweet marjoram, poppies for their savory seeds for baking, dill, fennel and caraway, formed the utility part of the garden. Hans and Gretchen bequeathed a pleasing old world touch of neatness and thrift to the northland.

Hollanders have not been far behind the Germans in settling the northland, though they have clung more to their individual communities than the Germans have. In dairy districts, we see them still extending their attention upon bulbous stocks. Early tulips, jonquils, narcissus and daffodils nod in the breeze from neatly attended formal beds. The Star-of-Bethlehem surely must carry some religious significance as well as floral beauty with them. In their front yards is about the only place where one will find azaleas blooming. This section has not the right soil for azaleas, so the Hollanders grow them in tubs. Lemon lilies, *Hemerocallis flava*, in circular beds, seem to be one of their necessary fixtures. While they do not have the great variety of flowers that the Germans grow, yet they are noted for their borders of pentstemons, scabiosas and china asters. These thrifty folk are often found cashing in on their early



WILDINGS ARE FAVORITES

Not everyone of the great numbers turning to the woods for plants is able, however, to grow small white lady's slipper

MILWAUKEE PUBLIC MUSEUM

nationality is to say the last word in flower gardening. They have surely clung to the lowly primrose and none seem to know how to raise this difficult flower as well as they do. *Violas* please the British settlers better than pansies, Sweet rockets, *Hesperis matronalis*, we owe to them. Moss roses, those hardiest garden roses, were first brought here by those from England. The Britisher or Scotchman will ever be

training and skill by raising bulbs on a commercial scale, since the quarantine regulations curtailed the import of cheaply grown bulbs from Holland. Such districts in Michigan and Wisconsin are locally known as "Little Holland."

The winters of these states sound like home to the Norsemen, so the majority of the Swedish, Norwegian and Danish immigrants have found a way there. Their tidiness is proverbial and their love of flowers has raised many of them to the rank of successful nurserymen or owners of perennial or strawflower farms. Their love of alpine flowers has given the rock garden a firm grip upon the fancies of the inhabitants. The Scandinavian cultivates every inch of his property, especially if he is a little restricted in acres. If we pass his place in the spring, we will find snowdrops, squills and moss-pinks. Later the Jacob's Ladder, columbines and coral bells will be springing up. His fences will likely be covered with perennial peas and morning-glories. The old-fashioned Persian yellow single rose will be a decoration for his front gate entrance, and he will have possibly one or two other hardy roses. Distinctive of his flower gardens are foxgloves, cockscombs, everlastings, wormwood, and hardy chrysanthemums. The Scandinavian housewife is also fond of her winter window flower garden and will grow wandering jew, geraniums and begonia slips, flourishing in tomato cans. When summer comes, these find their way outdoors.

The English and Scotch have also found the northland pleasing and but to mention their

FLAX OF THE ENGLISH

It has maintained its popularity ever since the first English settlers established it in its Lake States home

MILWAUKEE PUBLIC MUSEUM

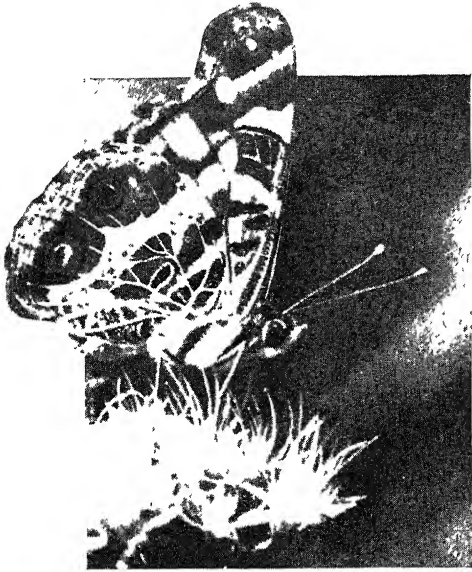
found well supplied with roses, hardy perennials, perhaps some tree standards and even a few hybrid teas.

A few things he brought to the northland suit us little better than the English sparrows. We can recall five of them: bouncing bet, moneywort, gill-over-the-ground, butter-and-eggs and cypress spurge. None of these stay put. Some kept the native superstitions surrounding them, such as butter-and-eggs. Early English farmers planted them in their barn yards, so that the milk would be sure to produce butter, the power of suggestion, we suppose, was exerted on his cows. But to them we owe also the centenarian peonies, the English wallflowers, stocks, the English daisy, harebells, cantebury bells, bluebells, sweet sultan, many kinds of pinks, blue lobelias and hollyhocks.

The English also liked their fragrant gardens and pot herbs and we usually find in their back yards such plants as lavender, mint, basil, thyme, parsley, summer savory, tansy, and tarragon. Two of their shrubs have

(Continued on page 338)





THE PAINTED BEAUTY
The Lake States harbor this hand-
some butterfly
GEORGE T. HILLMAN



LIKE A GINGERBREAD BUG
Most grotesque and terrifying is
Papilio's caterpillar
J. A. BROSNAN

INSECT LIFE

The Lake Land Shelters Many Kinds

by Edward G. Reinhard

University of Minnesota

LAND of more than 20,000 lakes, bordered by the largest of America's great inland seas, with drainage systems flowing northward to Hudson's Bay, eastward to the Atlantic Ocean, and southward to the Gulf of Mexico, cannot fail to give rise to a remarkable water fauna. Just as to the student of etymology Minnesota means "The land of sky-tinted water", and Michigan "The land of great water", and Wisconsin "The meeting place of the waters", so to the student of entomology these states signify a region teeming with aquatic insects.

Great was the delight of John Muir during his boyhood on a Wisconsin farm to watch the little black Gyrinid beetles whose "whole lives seemed to be play, skimming, swimming, swirling, and waltzing together in little groups on the edge of the lake and in the meadow springs, dancing to music we could never hear." The pond-skaters, too, seemed to him to be "wonderful fellows, shuffling about on top of the water, with air bubbles like little bladders tangled under their hairy feet," and the water-boatmen "were not less wonderful."

But one need not be a naturalist to be astounded by the richness of water-bred insects in this paradise of lakes and streams. The vast multitudes of May-flies that swarm through the air have been known at times to disrupt all business life in some of our riparian towns. These frail creatures, issuing from the water at the season of their swarming flights, have swept through the streets like a snow storm, impeding traffic and discouraging pedestrians by their heedless flight. Below the street

lamps their dead bodies have fallen in heaps and have been shoveled away by the bushel.

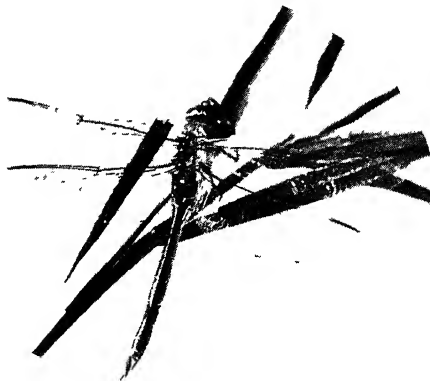
On the shores of Lake Pepin midge swarms have become a yearly occurrence. For ten days at a stretch, twice a year, these little fellows appear in such numbers that the visitation becomes a scourge. Words cannot describe the dense crowds that fill the air and cover buildings, trees and grass. Identified as *Chironomus plumosus*, they resemble large mosquitoes, but fortunately they neither bite nor sting. Their larvae are the "blood-worms" which dwell in the mud at the bottom of lakes and streams, and in Lake Pepin as many as six thousand larvae have been counted in one square yard of bottom.

The astonishing abundance of such insects can hardly be looked upon as a nuisance since they are all choice food for our fishes. Ardent fishermen from the White House as well as from crowded tenements are drawn to this vacation ground to hook the finny fighters these aquatic insects have helped to rear.

Up in the northern woods there are other swarms of water-born insects, which, to be sure, are pests a-plenty.

They are the black flies, persevering flails to man and beast. They breed in swift, rocky streams. The most hardy woodsman is vanquished by these tormenting gnats and even such a dauntless naturalist as Louis Agassiz refers feelingly to their attacks in his narrative of travels in the Lake Superior country.

The terrestrial features of these states likewise offer the most diverse conditions for the entertainment of insects of every rank and file. States which combine northern conifer-



UNIVERSITY OF MINNESOTA
THE AERONAUT AT ANCHOR
The buzz of the dragon fly is familiar in the land
of sky-blue waters

A SPHINX CATERPILLAR

For all the world like a begging wire-haired terrier

J. A. BROSNAN



KING OF HIS KIND

The monarch butterfly adds brilliance to the landscape

CORNELIA CLARKE



ous forests with extensive hardwood belts, tamarack bogs, patches of prairie, and even typical sand dunes, are sure to be the haunts of a varied insect population.

Each type of habitat is home for a winged host.

One of the most spectacular of butterflies, the Turnus swallow-tail, is often seen in the northern woods. About the shores of Lake Vermillion it occurs in countless numbers, a majestic black and yellow species. Even its caterpillars are startling and bizarre. When irritated they protrude a forked scent organ above the head and simulate the cobra by inflating a sort of false face which glares with two frightful eye spots.

The handsome comma butterfly with its thorny caterpillars is another common species. So too is the mourning cloak, the banded purple, and the viceroy, together with its pattern, the milkweed butterfly. One of the most beautiful sights in Nature is a migrating band of milkweed butterflies. In the fall these monarchs gather in large armies just previous to their southward journey, and such gatherings are sometimes witnessed about our wind breaks and along the sheltered river bottoms.

The dragon-flies and damselflies contribute to the vivacity of every country scene. They always attract attention because of their graceful form and sprightly aeronautics. The spotted Calopteryx and the orange-colored *Ischnura verticalis* are conspicuous among the damselflies, while the huge dragon, *Anax junus*, is constantly at work from April to November hawking about lawns, cornfields and along the margins of the woods.

The "high-elbowed grigs", with clacking castanets and zithering music, turn the grassland into a hippodrome of agile jumping and noisy stridulation. The Carolina locust is possibly the one most generally noticed even though its coloration fits perfectly into the background of its

habitation. The clear-winged locust, *Camnula pellucida*, is particularly abundant over uncultivated areas and dry soil, and almost thirty species of clumsy Melanopli find the Lake States suitable for their breeding grounds.

The much dreaded Rocky Mountain locust formerly invaded this part of the country. Its visitations were a

veritable plague, leaving the farmers dazed and destitute. The advance of cultivation and scientific methods of control have now rendered this species extinct in this trio of adjoining states. Minnesota, Wisconsin, and Michigan are particularly fortunate with respect to plant pests. One can hardly point to a single injurious insect which creates havoc within these borders to an extent at all comparable with the depredations of the weevils, the fruit-flies, the corn-borers or the host of other insects which are such a serious menace to agriculture in other parts of the United States. Diversified farming, crop rotation, and a rigorous winter climate are some of the factors which contribute to the decrease of severe insect outbreaks.

In the shady forests the two-winged flies reach their greatest abundance and woodland beetles, encased in horny shards, burrow industriously deep into the tree. (Continued on page 339)



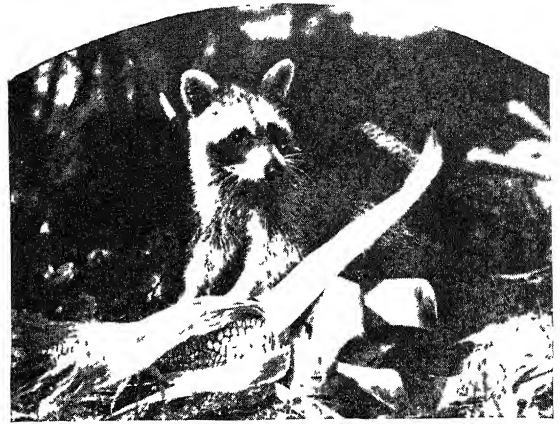
UNIVERSITY OF MINNESOTA

JUST A BOISTEROUS PAIR

Few worries have these lusty grasshoppers of the plains and dry lands

(Below) A gnarled red cedar stands guard on Gibraltar rock over the Lake County of Wisconsin

MILWAUKEE PUBLIC MUSEUM



C. C. ALSTON

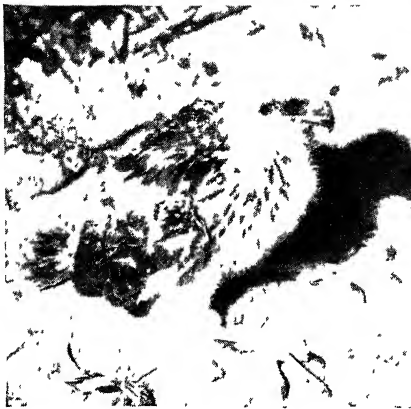
Bi'er Raccoon, caught with stolen corn, and, below, the handsome skunk-cabbage, first to bloom in spring

TEN THOUSAND
LAKES ASS'N



(Right) A young broadwinged hawk relaxes to think things over near his Lake States home

WIS CON COMM
AND A. O. GROSS



(Below) The rugged Rock Harbor on Isle Royale, Michigan, where dwells the mighty moose herd

MICH. DEPT. OF CONSERVATION



(Below) There were giants in those days, as this mighty prehistoric stone hammer, found in Minnesota, testifies

B. L. BROWN





WISCONSIN CONSERVATION COMM

THE FAMOUS DALLES OF THE ST CROIX
Preserved by Wisconsin and Minnesota jointly in Interstate Park
as the site of many natural wonders

ACRES of SUN-LIT WEALTH

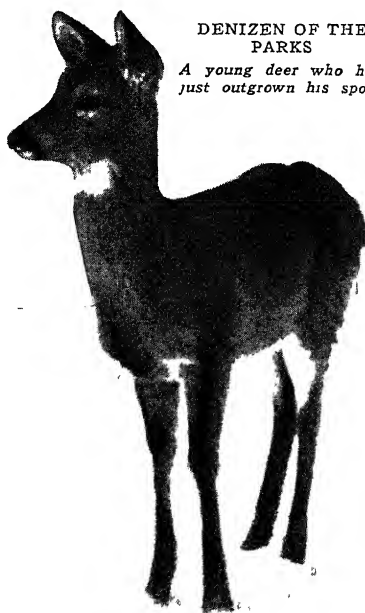
Anent the Past and Future of the Lake State Parks

by F. Rodney Paine

Superintendent of Parks, Duluth, Minnesota

STATE by State across the country there has been a tide of public wastefulness ebbing finally against the high ground of public sentiment for preservation. The history of the old world as well as of our own country tells us that such sentiment only develops when the waves begin wetting the feet of personal privilege. Had the people who today deplore the cutting of our forests, the depletion of our wild life and the desecration of our beauty spots lived in the abundance of these things in pioneer days they would have wasted their patrimony as their grandfathers have done. Whether the tide turns sooner or later in one state or another has depended on the vision of government or individuals.

Not until the last twenty-five years have the Lake States come to



DENIZEN OF THE
PARKS
A young deer who has
just outgrown his spots

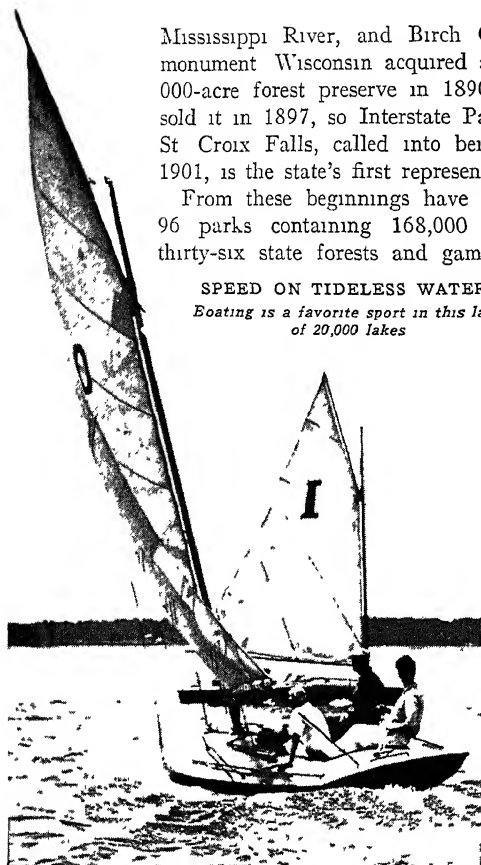
realize the possible exhaustion of their "inexhaustible resources." This awakening expressed itself first in the desire to preserve the glories of the past—the forts and battle grounds of French and Indian days, the wilderness areas familiar to the early voyageurs and pioneer settlers. As the automobile made the range of the recreation seeker and sportsman wider and wider, what was first sentiment became a demand, and the result was State Parks, Forests and Game reserves.

Michigan was among the first states to create such reserves, and Mackinac Island and Fort Michillimackinac parks, established in 1885, enjoy eminence in park history. Minnesota, six years later, followed with Itasca Lake State Park, embracing the source of the

Mississippi River, and Birch Coulee monument Wisconsin acquired a 50,000-acre forest preserve in 1890, but sold it in 1897, so Interstate Park at St Croix Falls, called into being in 1901, is the state's first representative

From these beginnings have grown 96 parks containing 168,000 acres, thirty-six state forests and game ref-

SPEED ON TIDELESS WATERS
Boating is a favorite sport in this land of 20,000 lakes



MINNEAPOLIS CIVIC AND COMMERCE ASSOCIATION

uges aggregating 1,800,000 acres and nearly 4,000,000 acres of National Forests. The total area thus set aside is larger than Delaware, Connecticut and Rhode Island combined. The attendance in fifty-six of Michigan's parks rose, in 1929, to seven and a half million people, or more than one and one-half times the population of the State. More than 138,000 of this number were campers, of which one-fifth came from other commonwealths. Similar use of the parks has been made in Minnesota and Wisconsin, although in none of the three states is the park system program near completion.

There are four main types of state parks in the lake country wilderness tracts, where primeval conditions abound, virgin timber areas preserving the last remnants of great forests, country traversed by beautiful rivers, ideally suited for recreational development for use by large numbers of people, and spots reserved principally because of their historical interest.

The State and National forests and larger state parks are the principal spots where deer, moose and bear, and abundant fish life still exist. The Superior National Forest in Minnesota is still much the same as the early voyageurs found it. Travel by canoe

CAMPING AMID THE DUNES

This Grand Haven, Michigan, park is one of several built on shifting sands



is today as easy as when Mackenzie threaded this country in the latter part of the eighteenth century—up the Great Lakes to Grand Portage, then up the Pigeon River and Boundary lakes to the Rainy Lake country—and his log of the trip will serve even now as an accurate guide.

Wisconsin's "Northern State" Park, home of forty lakes, the Hanson Military Reserve, in the heart of Michigan's wildest forest land, and the fifty square miles of Itasca Park, which contain most of the varieties of animal and plant life native to Minnesota, are probably the most beautiful wilderness areas in the three states. Itasca also contains a remnant of the original stands of white and Norway pine that once covered nearly seven-eighths of the total area of the Lake States. Michigan's primeval timber is preserved mainly in Cheboygan, F. W. Fletcher, Hartwick Pines and Interlochen Parks, and in Northern Forest Park. All three states are protecting by state forests a large supply of second growth timber, destined some day to redeem the waste of fifty years.

Some of the most beautiful preserves in the region have been created along rivers, such as Interstate Park, in which Wisconsin and Minnesota jointly have set aside for recreational purposes the marvellous Dalles of the St. Croix. Here the pilot of the sight-seeing launch will point out "The Old Man of the Dalles", the "Lion's Head", the "Devil's Chair", and other curious formations. Huge pot holes, some eighty feet deep, carve the Minnesota shore. Wisconsin's Nelson-Dewey Park on the bluffs of the Mississippi River is



WALTER HASTINGS
THE GREAT BLUE HERON
He oversees the order of things in several state parks

MICHIGAN DEPARTMENT OF CONSERVATION



A WINTER MIGRANT
The beautiful snowy owl visits the parks

notable for its canyons with walls of ragged rock, its brilliantly colored sandstone, and its column of petrified moss, and Pattison Park in the same state includes the one hundred and sixty-five foot Manitou Falls of the Black River, caused by the change from hard Keeweenaw volcanic rock to soft red sandstone of the Superior plain. Michigan has four undeveloped small

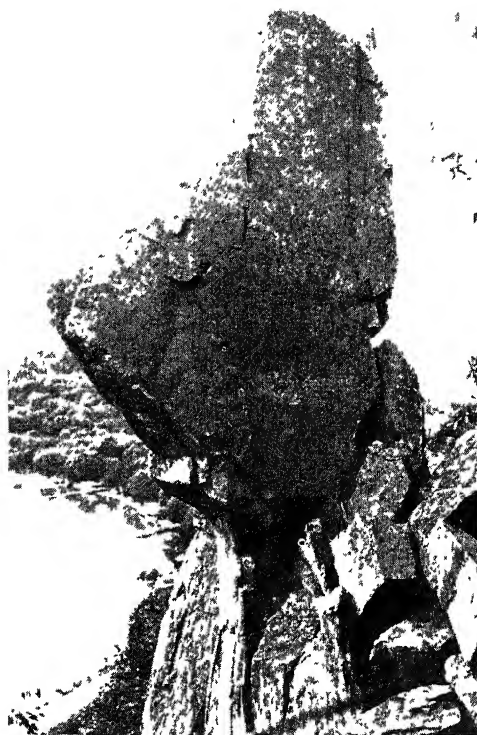
parks along the Père Marquette River, where fishing is unexcelled, and a Dodge Brothers preserve at Munus-kong Bay. In Minnesota, the four thousand acres of Jay Cooke State Park extend five miles on either side of the beautiful Dalles of the St. Louis.

Michigan has led her sister commonwealths in protecting the shores of the Great Lakes, and her twenty-five parks cover more than thirty miles of shore line. Peninsula Park embraces three thousand, four hundred Wisconsin acres along Green Bay, but Minnesota so far has utterly neglected the bold coast of Lake Superior.

Many of the parks and monuments are rich reminders of early pioneer days. In Perrot Park is Trempealeau Mountain which Father Hennepin discovered in 1680, and where a few years later Perrot took possession of all the land drained by the Upper Mississippi in the name of Louis XIV of France. Mackinac Island commemorates the old day of British rule, and the four Minnesota state monuments, which vary in size from one acre to eight, mark many incidents of frontier life and Indian warfare. Birch Coulee is the site of a Sioux

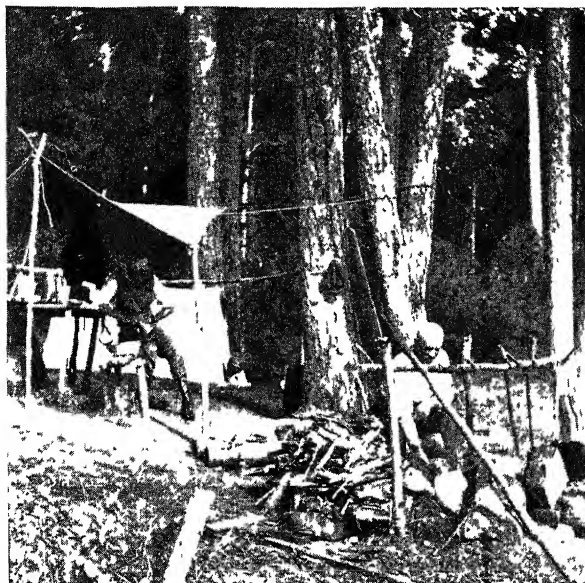
battlefield, and Traverse des Sioux Park marks the signing of the Indian treaty of 1851, while Wood Lake Park embraces the battlefield where was fought the last decisive contest of the Sioux war.

Unique, too, are those sand dune parks of Michigan—popular D. H. Day Park in Leelanau County, P. F.



CRAGS AT DEVILS LAKE PARK
Wisconsin preserves this interesting formation

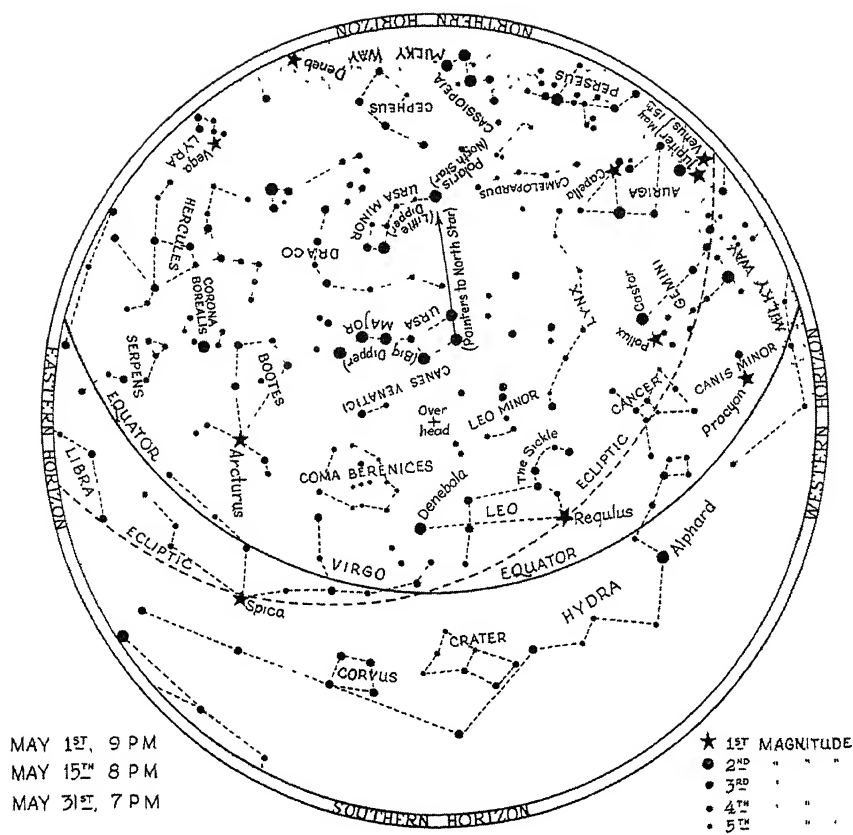
PREPARING THE EVENING MEAL
Thousands spend health-giving days camping in parks amid the lakes



Hoeft Park, Mason County Park, which is just one spectacular and impressive sand dune, and Van Buren Park, in which the dunes are covered with mature beech and maple. The entire nation feels a property in the phenomena these contain.

Just as the future of the parks of Minnesota, Wisconsin and Michigan is bound up with legislative action, so have the present systems evolved, and a straight line has not always been followed. Until 1925, Minnesota parks, monuments, forests and game work were sprinkled over various government departments, at that time, however, a Department of Conservation was created, to be controlled by a three man commission, consisting of the State Auditor and the Commissioners of Forestry and Fire Protection, and Game and Fish. Powers were given to acquire lands by gifts or power of eminent domain, but no general appropriation has been made, and bond issues are not approved. The sixteen parks have been secured by a variety of methods ranging from general tax levy and condemnation to transfer of state and

(Continued on page 343)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

THE EVENING SKY in MAY

The Month Marks the Change to Spring Constellations

by Isabel M. Lewis

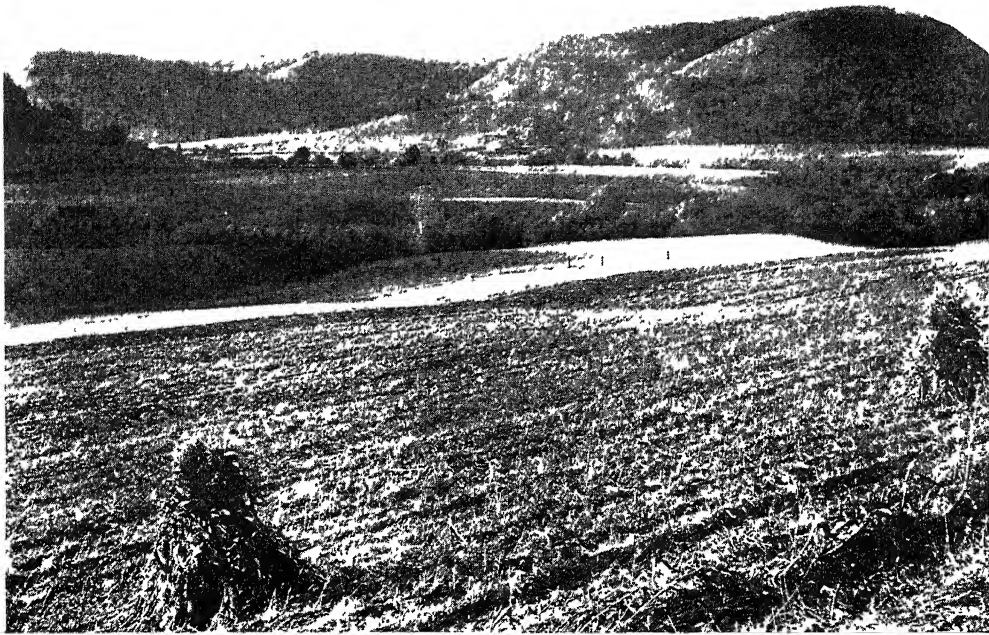
By the first of May at nine o'clock the last of the winter constellations are approaching the western horizon, or have disappeared beneath it. Capella, in Auriga, is still visible in the northwest, and Procyon, the little dog star, and Castor and Pollux, in Gemini, yet glow in the west, but of the two famous groups of Taurus the Bull and Orion, only the two stars that mark the tips of the horns, and Betelgeuze, remain in sight. Even these will shortly disappear below the horizon.

Vega, in Lyra, is now well in view in the northeast and its brilliant, bluish-white rays are a match in brightness for the golden glow of Capella in the northwest. The three most noted constellations of spring, Leo, Virgo and Boötes, now occupy the center of the celestial stage, Leo has just passed the meridian and is high in the western sky. The kite-shaped group of

Boötes, The Herdsman, may be easily recognized in the east with the magnificent Arcturus, of a distinctive orange hue, at its southern extremity. The long rambling constellation of Virgo, with its peculiar Y-shaped configuration, fills the greater part of the southeastern sky. Spica, which represents the sheaf of wheat in the hand of the Maiden, forms a distinctive, equal-sided triangle with Arcturus and Denebola, the second magnitude star at the tip of the lion's tail. Regulus, the remaining first magnitude star now visible, marks the end of the handle of The Sickle, in Leo.

Hydra, the Water-Snake, now stretches its huge, sinuous form entirely across the southern sky below Virgo, Leo and Cancer. The head is marked by a small group of stars in the southwest below the inconspicuous Cancer and the brightest star in Hydra, the second

(Continued on page 345)



WHERE THE GREAT ICE SHEET CREATED FOR THE FARMER
Wisconsin farmland in the heart of the till plains, where the melting ice deposited finely grained material destined to make wonderful soil for crops

U. S. FOREST SERVICE

Land of Lakes—How and Why

What the Prehistoric Ages Did for Michigan, Minnesota and Wisconsin

by K. C. McMurry

University of Michigan

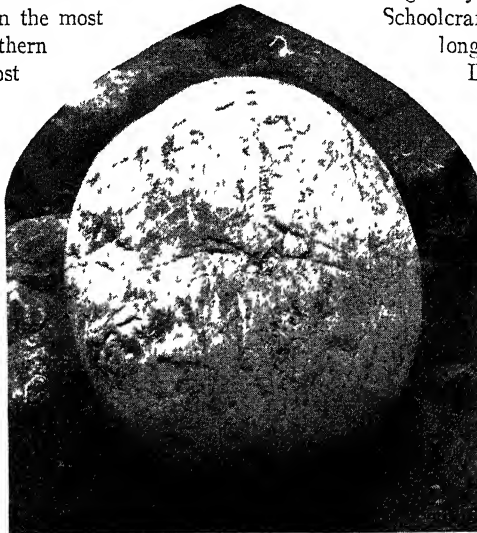
THE extreme diversity in scenery, forest cover and topography, in population and economic development of different sections of the Upper Lake States puzzles even the most unobservant. Why is the southern part of this region one of the most productive agricultural lands in the country, while the northern areas were formerly the home of one of the greatest timber supplies in the world? Why do lakes sprinkle some portions with the frequency of dew-drops on the grass of a summer morning, and others leave the visitor aesthetically thirsty? Why does an agricultural locality in southern Michigan, for example, gain a valuation of \$50,000,000 though unsupported by industrial cities while an equal area to the north is considered worth but \$2,000,000?

The answers take us back

to the dawn of time, through the mists of antiquity which the geologist's hammer and graphs are slowly clearing away. We must go back long before Schoolcraft, Marquette and Mackenzie, long before the Ojibway, Sioux and Dakota, back to the beginnings of things, to discover the original endowments of the different parts of this land of lakes, forests and rivers.

Among the past events which prepared the background for the present, the fact of glaciation is the most potent influence. It is a very recent phenomenon in a geological sense, however, and one must go behind it to the long series of geological events which took place during the aeons before the Ice Sheets moved south.

Northeastern Minnesota, northern Wisconsin, and the western part of the Upper Peninsula of Michigan



TEN THOUSAND LAKES GREATER MINNESOTA ASS'N

THE CAUSE OF POT-HOLES

Stones like this, caught in a vortex of water in days when Lake Superior flowed south through the St. Croix River, bored deep into the rocky hillsides, making queer formations

belong geologically to the Laurentian Upland of Canada. The rocks are of very ancient origin, are extremely complex, and have passed through many periods of alteration and change. During the Proterozoic era iron was deposited over extensive areas, and during the millions of years since that time has been concentrated in some sections to form exceedingly rich deposits of ore, especially in Minnesota, which leads in iron ore production, in Michigan, and to a small extent in Wisconsin.

In the Keewenaw Peninsula of Michigan, and to some extent in nearby sections, copper mining has been carried on since the pioneer period—in fact the copper was known and utilized by the Indians. This copper occurs

tending back into the era which followed the development of the Laurentians to the north.

Aside from the iron and copper of the north, these states do not boast an abundance of minerals, but local mineral industries, based upon various rock formations, are significant. Michigan normally leads the country in salt production. Thick beds of salt are found at shallow depths near Detroit, in the Saginaw Bay region, and on the west coast at Ludington and Manistee, while brines from deep wells near Midland and elsewhere form the basis of important chemical industries. In the southeastern part of the Michigan Basin coal occurs over an area of several thousand square miles, and coal mining on a small scale is carried on. In this same basin oil has been discovered at scattered points, and in recent years has been developed considerably. In southwestern Wisconsin the limestones contain lead and zinc, and these minerals have been of large importance historically in the area, and still are produced in some volume. Other minerals are found on a small scale, and building stones are important locally, although the great thickness of glacial drift which covers so large a part of these older formations causes difficulties in mining.

With the exception of a small area in southwestern Wisconsin, joined by a narrow strip across the Mississippi in Minnesota, the whole region was covered by the glacial ice. There were several recurrences of the glaciers but the last great movement was most important. In the lower peninsula of Michigan and the eastern part of the upper peninsula, in southern Wisconsin, and in southern and western Minnesota, the nearly horizontal sedimentary rocks of sandstone, limestone, and shale were almost completely covered by a thick deposit of glacial drift. This body of unconsolidated material, ranging from a few to more than a thousand feet in thickness, is made up of boulders, gravel, sand and clay, in some cases mixed together in a heterogeneous mass, in others more or

less assorted and homogeneous. This is the parent material from which the numerous soil types of the present have been developed, and in large part controls the character and value of lands for farming purposes.

The last ice invasion was very complicated. The surface over which it moved, developed through a long period of erosion preceding the glacial period, was more or less rough, with well developed drainage lines. Apparently great river systems occupied the Great Lakes region, with very deep and broad valleys, and cut below the surrounding upland. Instead of one great sheet of ice, moving more or less regularly, and retreating at a uniform rate, as was the case in the earlier invasions in Illinois, Iowa, and adjoining regions, this region was traversed by a number of separate lobes, probably caused by the ice following the previously developed broad river valleys. These were deepened and widened into a close approximation of the present basins of the Great Lakes by the active ice movement. The old drain-



MICHIGAN TOURIST AND RESORT ASS'N
TOPOGRAPHICAL CHANGES IN THE MAKING
A Michigan sand dune, a relentless invading enemy, moves on a wooded section to swallow it up

in the native state, scattered through the conglomerates, and in veins. Enormous masses of native copper have been found from time to time, and the region has been of immense importance in the past in supplying the demand of the whole country.

In Michigan's Lower Peninsula, and in the western half of the Upper Peninsula, as in southern Wisconsin, and southern and western Minnesota, the rocks which appear here and there at the surface, and which underlie the thick deposits of glacial drift, are younger than those of the north, and are of sedimentary origin, laid down in island seas. Broadly speaking these rocks are more or less horizontal in structure, and have been disturbed but little since their deposition. In southern Michigan a very gently sloping basin is present in terms of rock structure, so that the older formations are exposed here and there about the edges of the state, while younger strata appear near the center. In Wisconsin and Minnesota the rocks are of greater age, in general, ex-

age-pattern, of course, was changed radically, for scouring in one place was offset by deposition in another, and the ancient outlets were blocked. In the case of Lake Superior, and perhaps to some extent in the other Lakes, rock structure also is involved in the basin development, and changes in levels since the retreat of the ice, with tilting on a large scale, have modified the situation to its present character.

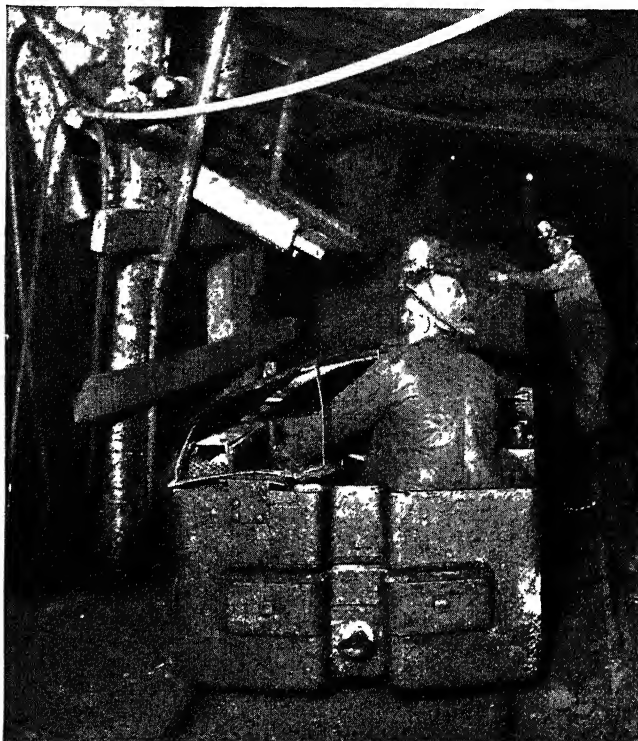
The general result of the lobate character of ice movement was a great variety of forms of glacial deposition, in many cases with various types of formations occurring within a small area. Irregularity was further enhanced by the irregular character of movement, for the withdrawal of the ice involved a series of retreats and pauses. For a very long time after this withdrawal, outlets to the north were still blocked, and a series of outlets to the south were developed to include the upper Mississippi, the Wisconsin River, the Illinois, and several others to the eastward. The areas covered by the lakes varied considerably from time to time with changes in outlet, and much country now land was at one time or other covered by lake waters.

Where the ice fronts paused for considerable periods moraines were deposited in irregular ridge-like belts made up of interspersed knobs and depressions. Such moraines contain many sorts of material. Belts of loam soil, so rough as to make cultivation difficult, and to accentuate soil erosion, were formed. Today these lands serve best as permanent pastures. In other places, boulders are so numerous as to make cultivation difficult, while elsewhere deposits of sand account for the poor soils. The principal gravel deposits, so important in recent years, occur largely in moraines. In these belts too, especially in the south, are found most of the small lakes with their resort developments.

The waters from the melting ice carried the finer materials away from the ice fronts, and the coarser materials, sand and gravel, were deposited as outwash plains, as the finer clays and silts were carried far away by the streams. Such outwash plains, though commonly level in surface, have generally poor soils, due to the large percentage of sand. They are developed to their greatest extent in the northern part of lower Michigan, but cover large areas also in the Upper Peninsula, and Wisconsin. Where the ice retreated slowly and regularly, till-plains were formed. These areas were of gently rolling surface, with fine-grained material which later developed into excellent quality soils. Such till-plains correspond to the level areas which are so extensive farther south in Indiana, Illinois, and Iowa. They make up the better farming sections in the southern part of the region, but are much more limited in extent in the north. Areas covered for considerable periods by the waters of the larger Great Lakes, such as the southeastern corner of Michigan, and a large area about Saginaw Bay, were subjected to the

work of waves and currents in more or less shallow waters. These lake plains in part furnish excellent soil materials, where clays were deposited, but in the shallower waters sand was the chief material. Where artificial drainage has been developed, some of these lands are highly productive, for the surfaces are level, and easily tilled.

The sandy sections are uniformly poor. The largest lake plain of all, and perhaps the finest land of the whole region, is found in northwestern Minnesota where a great shallow lake, called Lake Agassiz by geologists, covered more than one hundred thousand square miles of territory, an area greater than that



REAPING WHAT NATURE PLANTED AEONS BEFORE BUTLER
Under ground in a coal mine in Michigan. Much of the Lake States wealth was born before the Ice Age.

of all the present Great Lakes combined. This body of water extended westward into North Dakota, and far northward into Canada, but was very shallow, and in it immense quantities of material were laid down by the ice to the north, and worked over by waves and currents to be spread out into a thick, level deposit of fine grained material. As the ice finally melted away to the north an outlet to Hudson Bay developed, and the old southern drainway through the Minnesota to the Mississippi was abandoned. Now only the few deeper parts of Lake Agassiz, such as Lake Winnipeg, remain, and the level, fine soiled plain remains as the heart of the spring wheat region.

The Superior Upland, including the western part of the Upper Peninsula of Michigan, northern Wisconsin, and Northeastern Minnesota, had a radically different glacial history. The whole of this country was glaciated, but the conditions were different from

(Continued on page 345)

THINGS to THINK ABOUT

The Bobwhite in Ohio

Nearly twenty years ago the Chief of the Biological Survey, as a result of intensive studies of the food habits of Bobwhite, suggested that the bird might prove too valuable as an insect destroyer to be killed for food or sport. Evidently the Ohio farmer considered that it was, for in 1915 the Legislature of that State removed Bobwhite from the list of birds that could be shot. In spite of many efforts on the part of its enemies to put the bird back on the game list, this protective law is still in effect.

Now it is a favorite theory among those who wish to kill Bobwhite, that total protection is fatal to the bird, since the sportsmen are no longer interested in its preservation, and starvation and enemies soon reduce its numbers. With this theory in mind, we have been led to examine the records of Christmas bird censuses made in Ohio during a series of years. On these occasions bird lovers, singly or in small parties, make trips through suitable bird territory, walking all or part of a day, and recording all birds seen. These censuses are published each year in *Bird Lore*, the official organ of the National Association of Audubon Societies.

Following are the numbers of Bobwhites recorded by these observers since 1909, the figures for alternate years only being cited to save space.

In 1909, 15 observers saw 54 Bobwhites, 1911 27 saw 51, 1913 20 saw 18, 1915 28 saw 14, 1917 19 saw 18, 1919 18 saw 117, 1921 35 saw 252, 1923 28 saw 230, 1925 52 saw 851, 1927 62 saw 862, 1929 52 saw 659.

Evidently the Bobwhite in Ohio is prospering under this kind of protection. To those states eager to increase the numbers of birds in their covers, we earnestly recommend Ohio's plan.

Refuges for Waterfowl

Dr. T. S. Roberts, probably our greatest authority on the birds of the Lake States, writing in a recent number of *Bud Lore*, organ of the National Association of Audubon Societies, sounds a warning that may well be generally heeded. In discussing refuges for waterfowl, with special reference to conditions in Minnesota, he says:

"It should be evident to the thinking man that these refuges cannot be also public shooting-grounds or even immediately adjoining such grounds. The average sportsman's view of conservation is to protect only to kill later. This will have to undergo considerable modification and readjustment if our game-birds are ever to be common again. It is not so very long ago that 4,000,000 ducks were killed in Minnesota during two consecutive shooting seasons! This can probably never be done again nor anything like it. But there are still many ducks, and they can be saved and will mul-

A Page Devoted to Conservation from Varying Angles

tiple in spite of dramage and cultivation if they are given a fair chance. Our sloughs and ponds would soon be full of nesting Teal, Mallards, Pintails, Spoonbills, and perhaps some Gadwalls, Redheads, and Ring-necks if the increase were not annually shot off on the opening days and those that escape made wary about returning."

Deer, Dead or Alive

The following is from an editorial in the *Rockford Republic*:

"The *Milwaukee Journal* comments ably upon the fact that more than 240 persons in Chippewa county have petitioned to have the deer hunting season closed. Some day, the editor believes, more than half the population of Wisconsin will insist that the deer season be closed permanently.

"This editorial is in line with the most progressive modern thought which is opposed to the slaughter of wild creatures for sport and in harmony with conservation of such life and beauty as may remain in our diminishing wilds.

"Some day," the *Journal* continues, "we are going to realize that one live deer is worth 100 dead ones. We are going to understand that a tourist and outdoor business that gives Wisconsin \$75,000,000 or \$100,000,000 income in a year is based on such things as deer and other wilderness creatures, forests, waters and scenic beauty.

"Why then allow an army of 25,000 to shoot it full of holes? Twenty-five thousand guns can do much damage. Yet it is only 1 per cent of Wisconsin's population.

"Why should 99 per cent of the people allow their property to be shot to pieces by 1 per cent?"

"That, evidently is being asked in the state. More and more 'sportsmen' become conservationists. Instead of just slaughtering they now demand closed seasons—for deer, rabbits, other game. The conservation commission has had many petitions to that effect."

Wild Life Values

From *Parks and Recreation*, Nov-Dec, 1928, we glean the following: "As the closed seasons are prolonged, men and women will find that the camera is a better hunting instrument than the gun. They will learn that just watching may be finer sport than killing. It takes more woods skill, more understanding to get one good deer picture than many dead bucks. It takes more woodcraft to watch a deer group for a half hour than to bring in dead trophies.

"When and if wilderness creatures become so numerous that they crowd upon our fields and really damage our crops, then there may be an economic reason for killing

them. Otherwise upper Wisconsin resort owners, every man who does business with tourists or shares in the \$75,000,000 or \$100,000,000 of revenue that the outdoor business yields, knows that a single living deer, showing himself to visitors at camp, hotel or cottage, is worth more than any number of dead deer, dragged out of the woods."

Protect the Woodcock

An editorial in *Field and Stream* for February carries the cheering statement that a move to close the season on woodcock is gaining headway. This is indeed good news, for we know of no bird, unless it be the equally persecuted ruffed grouse, that needs the helping hand of the Nature Lover more than does our wood snipe. Reading farther, we note that the editorial opposes any more restrictions on the gunner. The claim is made that woodcock are increasing and the yearly kills in New York and New Jersey are cited as proof. It is not pointed out, however, that these states, situated on the line of flight from the Northeast, the section of the country that now raises the vanishing remnant, are in the front rank of the destroyers of this interesting bird.

This editorial assumes that the Federal Government, which last year reduced the daily limit to four birds, and the season to one month in each section along the bird's migratory path, is ignorant of the true status of the woodcock. It is intimated that the ornithologists, and what are termed the swivel-chair nature students, know very little about this bird, but that the gunner knows all about it that is worth knowing. And every woodcock hunter who believes that the woodcock is increasing is urged to give the Biological Survey the benefit of his experience.

The people who are destroying our vanishing game birds, then, are to make a concerted effort to convince the Federal Government that their victims are prospering under this persecution. While the woodcock hunters are carrying out these instructions, why should not the friends of the dying woodcock have something to say? Was our Federal migratory bird law enacted to protect our birds and so to benefit all our people, or was it framed to assist a selfish minority to destroy our wild life resources? Is it not time that this question was settled?

Billboard Report

Copies of the report of the survey of the roadside beautification and billboard situation in North Carolina are now available for those actively interested in this work. The booklet is entitled "Roadsides of North Carolina" and will be sent in response to requests to the American Nature Association.



PLANTING THE GARDEN, MONTH BY MONTH

By Romaine B Ware

OUR gardens at this season are veritable beehives of activity. Nature is all atingle with life and we must keep busy every minute. This is the heyday of spring planting. As soon as the soil warms up, the annual seeds may be sown right outside where they are to bloom. Sweet alyssum, portulaca, the glorious poppies, eschscholtzia, nasturtiums, bachelor's buttons, ricinus, and many other things will come along promptly if you do your part by preparing the soil well and seeing that they do not want for water. As soon as all danger of frost is past in your sector, the plants of annuals that have been started indoors may be set out where they are to bloom. Harden them off gradually by exposure to the outdoor air during the warm hours of the days and when you transplant them there will be little setback. A cloudy, cool day is the most desirable to set them out and with few exceptions each plant should be pinched back to induce branching and to balance the top growth with the disturbed root growth resulting from transplanting.

In grouping the plants in your borders, avoid straight lines and geometric designs. Mass them in irregular drifts and groups to obtain the most natural effect possible. Avoid all stiff, formal arrangements and let the different varieties mingle with each other. The goal is to have a design but to avoid all appearance of one. Your design must locate the various plants in relation to each other with most of the taller ones to the rear, gradually decreasing in height toward the front of the border where low-growing varieties make the best edging. Here and there taller things may be brought to the front for the sake of variety but throughout the entire border there should be the informality that Mother Nature employs in her gardening.

Many perennials, especially late summer and fall blooming varieties, may be planted now. Early blooming kinds are best left till fall or at least till after their flowering periods are over. With perennials that are planted and left undisturbed for some years, it is important that the soil be well prepared and enriched to a goodly depth so that the roots may not want food, at least for a few seasons. Be sure of drainage in all perennial plantings as few will succeed if it is poor.

Evergreens may be moved during the spring, from the time frost leaves the ground till active growth is well started. They may also be moved in late summer or early fall, but in the spring the weather is day by day becoming better and more favorable to their growth. Moisture conditions in the soil are likely to be right now as throughout so much of the country dry summers and falls are common.

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PLANTS are 95% water. They must have constant moisture if they are to grow as well as you believe they should. To supply such moisture—to have it readily available in sufficient quantities for plant use day or night as the need arises, requires more than occasional showers or watering.

The soil must retain moisture; not as a lake or a puddle but within its particles so that roots can get at it. This is the physical condition of the soil and correct physical condition can only be attained by mixing organic matter contributing active humus in with garden soil to give it the necessary absorption capacity.

In fact the productive fertility of your soil depends more upon this physical condition than upon fertilizers. If your soil is too sandy, or too clayey, or too loose, or too tightly packed—even if it is chock full of fertilizers that are not dissolved and held in suspension in water ready for immediate use—your plants will not yield flower or fruit as they should.

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THE LAND OF MANY LAKES

(Continued from page 292)

long before the first axe- and plow-armed settlers invaded the forbidding wilderness, still clings precariously to his haunts in rivers and lakes of the north. Gone, or nearly gone, are most of the other species that formed important items of baiter, in the days when rum was traded for pelts with the Ojibways and Ottawas, when dishonest traders added equal parts of water to the rum, and the Indians took blood in place of honest dealing. As passed the furbearers, so dwindled the forests, and now even the third great resource, mighty fisheries of the fresh water seas, is showing the strain of intensive methods. It presents one of the most difficult problems with which conservationists have now to deal.

It was thoughts of golden harvests that drew the first settlers to the Lake States. Nor did the southern sections disappoint the hardy settlers who wiped out the hardwoods to make way for their farms. The great bed of lost Lake Agassiz, coated with rich alluvial deposits, today forms one of the most productive wheat lands in the world. Wisconsin is renowned for her dairy products, and the fruit belt of western Michigan is unexcelled. Here, the winds off Lake Michigan retard the coming of spring so that apples, peaches, cherries, grapes and other fruits are late in blossoming, with the result that they escape the danger of late frosts. There are beet sugar areas in Saginaw Basin, and a fringe of the corn belt in southern Minnesota. With the passing of the pine forests to the north, the agricultural frontier was pushed northward throughout the region between 1880 and 1910, but here it met adverse conditions in poor soils, hard marketing situations and a short season, so today, though farms are still being cleared, they are being abandoned at an even greater rate. The future this country holds is closely linked with recreation and reforestation, the one to bring present income, the other to lay the seeds for a rich harvest in generations to come.

Not all the wealthy bounty bestowed upon these states lay above the ground. The most productive iron mines in the world are in the Mesabi range in northern Minnesota, and Michigan and parts of Wisconsin, too, send out red ore for the nation's industries in such great bulk that the world famous locks at Sault Ste. Marie carry annually more commerce than the Panama Canal, due to this commodity and the golden wheat from farther West. The copper mines of northern Michigan are the only important ones in the United States proper. Michigan also has important oil fields and the country's greatest salt wells, while zinc and lead add to Wisconsin's underground wealth.

It is a great land of forest and water, this region of the upper Great Lakes, rich in birds and flowers, trees and wild life. For those who know it, it has an almost irresistible appeal. And like many other states whose past has been bound up in dwindling supplies of forest, fish and fur, it has accepted the beacon of conservation to light the avenues of future time and to prevent missteps in the dark.

The Western Trip

This issue is devoted to the Upper Lake States and there is no wish to encroach upon the available space—which was all too limited for telling the fascinating story of this region—with extended report on the American Nature Association field trips for this summer. May we, however, take this small space to report that the limited groups are rapidly being filled and to urge that all those who are planning to take one of the trips get in touch with Mr. Richard W. Westwood, Chief Editorial Staff, *Nature Magazine*, Washington, D. C. If you haven't already gotten a copy of *On Western Trails*, describing the trips, there are still copies available.

BIRDS OF HIAWATHA LAND

(Continued from page 296)

or being indifferent to their fate, maintained a two months' open season from 1920 to 1926, apparently convinced of the need it has closed the season during the past three years. Wisconsin has treated its birds still differently. Close seasons were in force, 1920-1924, but this was followed by three years with a two months' open season, and one year with one month. In 1929, however, the season was closed. As far as state laws can be relied on as evidence, and they must be considered as at least partially indicative of abundance, these progressively restrictive laws point to a declining supply.

The prairie chicken was protected in Michigan, 1920 to 1924, but since then has had a short open season, with the exception of 1928, when the season was closed. In Minnesota the rule has been to close the season in alternate years, with an open season of about two weeks in the odd years. Wisconsin has maintained an open season of four or five days (with a close season in most southern and western counties) until 1929, when the season was closed over all the state.

In the case of the ruffed grouse, Michigan had a long open season, 1920-1924, the open season was cut to one week in 1925 and 1926, closed entirely in 1927 and 1928, and opened for a few days in 1929. Minnesota tried alternate open and close seasons 1920-1924, but has closed the season every year since. Wisconsin, after closing the season in 1920, tried a short open season of usually five days from 1921 to 1927, but still had to forbid killing entirely in 1928 and 1929.

And so goes the story. Is it not plain that these beautiful birds can not withstand the increased toll due to settlement, larger numbers of hunters, and improved transportation facilities? Is it not evident that a changed viewpoint as to values is necessary? It is gratifying to note, however, that in all these states our native game birds are coming to be more appreciated. When it is fully realized that harmless and beautiful wild life belongs to all our citizenry, then shall we learn the true meaning of conservation.

WILDINGS OF THE LAND OF LAKES

(Continued from page 307)

it in springtime,—ranging from the white of Labrador tea, *Ledum groenlandicum*, leather-leaf, *Chamaedaphne calyculata*, and bog rosemary, *Andromeda glaucophylla*, to the deep rose pink of the bog laurel, *Kalmia polifolia*. On the dry pine ridges are close-tangled mats of the bear-berry or kinnikinnick, *Arctostaphylos uva-ursi*, and almost everywhere over the ridges the shining leathery leaves and scarlet aromatic berries of the wintergreen. One little plant growing here among the heaths gives delight to all who see it. This is the dwarf cornel or bunchberry *Cornus canadensis*, the smallest of our dogwoods. There is nothing lovelier in all the north woods.

Midsummer brings the flowers of other heaths that are common throughout the pine forests. Among these are the shin-leaves, *Pyrola secunda*, *chlorantha*, *elliptica*, and *americana*—all with beautiful and perceptibly fragrant flowers. And at the time when the shin-leaves cease to bloom one has the feeling that summer is on the wane. Another graceful and delicate heath blossoming at the same time as the shin-leaves is the prince's pine, *Chimaphila umbellata*. The prince's pine is not abundant, though fairly common on shady wooded slopes. We should not omit from this category that strange member that in August appears suddenly to have sprung from the earth's rich leaf-mold,—the delicate clear-white Indian pipe, *Monotropa uniflora*. Many of the Indian pipe clusters are of great size and their beauty is worth a day's journey to see, but it is useless to pluck these flowers for in a short time they become a soft black mass. In August, too, is the harvest of blueberries and of wild raspberries, and the roadside splendor of golden-rods and asters.

Of all the alluring places in the north woods the cedar swamp is supreme. A dark and mysterious place it seems to be, the abode of elves and other eerie shapes. All around a confusion of deadfalls thickly over-grown with soft green moss. What quaint flowering forms grow here,—tall upstanding orchids, *Habenaria orbiculata*, the dainty mitrewort, *Mitella nuda* clinging to the moss, here in a water-hole robust marsh-marigolds and there by themselves a little group of one-flowered shin-leaf, *Moneses uniflora*. Then just beyond a ponderous moss-grown deadfall we spy the exquisite showy lady's-slipper, *Cypripedium reginae*. And here is the pine-sap, *Monotropa hypopitys*. These lucky finds should satisfy us for the day, but there is one more denizen of these woods that our curiosity prompts us to seek before we return to the trail. It should be found here, and it is—the Lapland buttercup, *Ranunculus lapponicus*, its thickish three-lobed leaves so closely pressed against the moss as almost to defy detection. This is a boreal buttercup of both the Old and the New World, which in these swamps reaches its southernmost range.

Thus the days we spend in these woodlands will reveal to us the abundance of its plant life, and we shall come to look upon the woods with growing appreciation of its secrets.

LAND OF THE SKY-BLUE WATER

(Continued from page 299)

beautiful and significant as those of members of his family. No wonder the Sioux wished to keep his land. But the Chippewa saw the land and waged bitter warfare for it. And gradually the Chippewa wigwams displaced the tepees of the Sioux on the lake shores.

Just as the lake country was defended by one tribe and coveted by another hardly more than a hundred years ago, so today, there is a new alignment of opposing forces striving for possession. One band is composed of all the out-of-doors lovers who have ever travelled the Middle West and a stalwart resident group who see the recreation possibilities of this land of sky-blue water. The other is the stragglng remnant of the wasters who squandered the natural resources of the Great Lakes country, who sheared away the mighty forests and devastated the wild life with no regard for the morrow. But the lovers of the out-of-doors will have the victory. The reaction to the waste of two generations ago can be seen in movements to protect watersheds and restore drained lake country, and in replanting the vanished forests. The most ambitious of the conservation plans has been proposed for the Superior Forest region of Northern Minnesota. Here are found the most marvelous canoe routes in this country, stretching for hundreds of miles through chains of lakes which in summer are accessible only by boat or airplane. It is a wilderness, but one already touched by the mechanical age. One pending project would convert the group of lakes along the Minnesota-Ontario border in the Rainy Lake drainage basin into a series of storage reservoirs for power plants farther down stream.

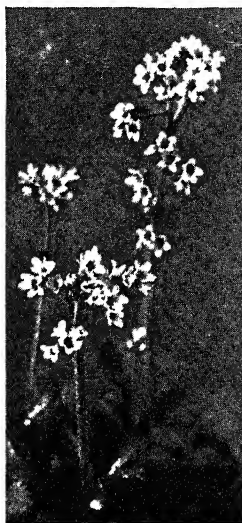
This power project has met strong resistance. As a counter proposal, conservationists urge that the whole region north and south of the Minnesota-Ontario border be set aside as the Superior-Quetico international forest and park. Such action would preserve the lakes from unjustifiable and uneconomic spoliation. It would recognize, as never has been done before, the public recreational and scenic value of areas such as are the fortunate possession of Minnesota, Wisconsin and Michigan.

In summer when the wavelets sparkle like diamonds, by night when moonbeams bathe them in silver light, under lowering skies of November, or even when buried deep in winter snows—at all times, the lakes and streams are inspiring to look upon. And the charm of Wisconsin, Michigan, and Minnesota is inextricably bound up in these water courses. It lies in the grandeur of gorge and waterfall, the quiet laughter of shaded brooks, the scenic delights of endless lakes winding deep into the recesses of the wilderness where the evils of our civilization have no place. The peculiar wild beauty of the larger waters of the north the exquisite grace of the thousands of jewel-like shallower lakes—all comprise a rare heritage such as no other part of the continent can boast. And here come hundreds of thousands of Americans—who will not be driven away, as were the Sioux—to find beauty and contentment in the land of lakes.

Happy Rock Plants

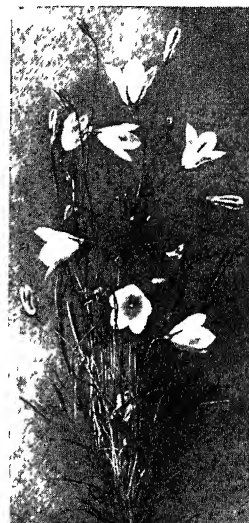
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MICHIGAN SETS GREAT EXAMPLE TO NATION IN MEMORIAL FOREST PLAN

TO THE Lake States and to the nation a fine example in reforestation is being set by the Detroit News. The State of Michigan owns 1,390,000 acres of denuded, cut-over forest lands. Of these, 453,000 acres are in established, administered state forest reserves. All need reforestation. With this fact before it the News inaugurated a memorial forest planting campaign and called upon its readers to subscribe to units in the planting program. About 138,000 took part in the plan. School children subscribed dimes and individuals hundreds of dollars. The sum of \$25,000 has been donated to date. This means that 10,000 acres can be planted, for the amount is sufficient to cover all labor costs for planting.

The plan, which was first announced September 22, 1929, allows any citizen or organization to finance the planting of a 40-acre pine forest on land in one of the 12 state forest reserves by paying \$100. The State will care for the seedlings after they grow to maturity. This care includes protection against fire and against insects which harm trees. The state forest reserves will remain forever the property of the State, and in 50 to 100 years, when the trees have reached a marketable size, they will be scientifically harvested for the benefit of the State.

Planting and field operations began in the 12 state forests on April 15 under the direction of State Forester Marcus Schaaf. For the first time in the history of the State sufficient money is now available to plant, at one time, 10,000 acres of denuded, idle public lands to pine trees.

This planting, the largest seasonable planting that has taken place in the 12 state forests since their establishment in 1904, means that over 10,000,000 white, Norway and jack pine seedling trees will be started on their way toward maturity through the interest displayed in reforestation by citizens of Michigan.

The 10,000 acres are distributed throughout the 12 state forest reserves located as follows: Houghton Lake Forest Reserve in Roscommon County, Fife Lake Forest Reserve in Kalkaska County, Lake Superior Forest Reserve in Luce County, Ogemaw Forest Reserve in Ogemaw County, Presque Isle Forest Reserve in Montmorency County, Alpena Forest Reserve in Alpena County, Pigeon River Forest Reserve in Otsego County, Black Lake Forest Reserve in Cheboygan County, Hardwood Forest Reserve in Charlevoix County, Mackinac Forest Reserve in Mackinac County, Au Sable Forest Reserve in Oscoda County and the Higgins Lake Forest Reserve in Roscommon and Crawford counties.

These 12 units are now all under forest management and embrace 453,000 acres, 80,000 acres of which have been added

to the reserves since the inauguration of the News plan.

All contributors to this plan will be notified as to the exact date of the beginning of the plantings upon their forest plots. All who care to may journey to these forest reserves and participate in planting the first trees on the areas set aside for them.

Col. George R. Hogarth, conservation director of Michigan, who has charge of all state conservation activities says: "It is gratifying to know that we were to be given some assistance

Gives a Michigan Forest to Purdue

Chase S. Osborn, former governor of Michigan, and a graduate of Purdue University, has presented 5,200 acres of virgin hardwood lands in the Upper Peninsula to his alma mater. The lands are in Chippewa and Luce counties, well located for economical logging and lumbering or the practice of forestry.

"It is a great-hearted gift from a great-hearted man," said President Elliott of Purdue in a statement announcing the benefaction, "and it will add immensely to the power of Purdue."

The story of Chase Osborn, reporter, newspaper man, von hunter, discoverer of the Moose Mountain iron range in Ontario, world explorer, governor, has been an inspiration to many an Upper Peninsula boy. He was born on a farm near Warren, Indiana, worked his way through school, walked the ties to Chicago and got his first job with the Chicago Tribune. The value of Mr. Osborn's gift to Purdue University is greater twice over than the original endowment by John Purdue, the founder

in our program of reforestation. I had no idea of the wide appeal of the project. The mere fact that your readers and contributors have donated \$25,000 during the first five months the plan has been in effect is sufficient evidence of its success, and its appeal to a far-sighted commonwealth.

"It is highly gratifying to learn of the splendid response of the school children, civic organizations, women's clubs and patriotic individuals who apparently sense the economic benefits certain to accrue to Michigan through forest renewal."

These forest plantations will be set aside as memorials in the names of their donors or anyone they care to honor. The Detroit News will erect a metal sign on each plantation carrying the number of acres planted, the donor's name and address, and the name of the individual, organization or institution commemorated.

Donors are informed of the location of each plantation as soon as the State makes its selection of tracts to be planted.

Contributions from Upper Peninsula residents will be used for planting pine trees in the state forest reserves in Luce and Mackinac counties, those from the Lower Peninsula in the 10 state forests below the Straits, or in other forest reserves as established.

The plan is an enduring one and will continue from year to year with plantings taking place each spring and fall. Each seasonable planting will take about two months. The capacity of the pine tree seedling nursery, at Higgins Lake, is 25,000,000 trees for 1930, 40,000,000 for 1931, and this will be increased each year to meet whatever planting program is assured.

There are many states in which the same forest planting plan would be a great success if taken up by a public-spirited newspaper in co-operation with the state foresters, according to Charles Lathrop Pack, president of the American Tree Association. The memorial appeal is a fine one and such a campaign has the added value of putting before the people of a state the exact situation as to their forest resources. At the same time it allows the people to help directly in correcting a situation that needs correcting if there is to be security in our economic scheme.

NATURE IN PRINT

Another Holiday

We have before remarked that Edith M. Patch has a fine faculty for presenting Nature facts in fascinating fashion for youthful consumption, and this remark is further supported by her latest book, *Holiday Meadow*. This is a companion volume to *Holiday Pond*, and as the first book dealt with the life found in the water so this newest one deals with the life in the nearby meadow. They are little stories about what one finds in the meadow—any meadow—and calculated to stir avid interest in the young reader the next time a meadow is encountered. The book is published by Macmillan and is illustrated with photographs.

Elementary Science

In bringing out their series of elementary science readers D. Appleton and Company have not worked in numerical order and now, last, comes Book One in the series of readers known under the group title of *Elementary Science by Grades*. The co-authors are Elizabeth K. Peeples and Ellis C. Persing. They have done an excellent job with a very difficult subject. The preparation of a primer in this field means much careful weighing of the subject and much wise selection. This the authors have obviously done and perhaps that explains why the first should be last. We are pleased to recommend this series of readers.

Nature Biographies

One of the popular features of *Nature Magazine* is the frequent biographical article about naturalists, past and present. Biography is, generally, very popular at the moment anyway. Quite apropos, therefore, is *American Naturalists* by Henry Chester Tracy. This is a volume containing concise and fascinating sketches of twenty-one men and women whose names are writ indelibly on the pages of American natural history. Some are alive today and some have passed away, but the selection is interesting and catholic. Mr. Tracy's handling of his subjects is charming and he presents us with a book well worthy of the having. The publishers are E. P. Dutton and Company.

For Trout Fishermen

Fishermen who love to play the trout will welcome *Taking Trout with the Dry Fly* by Samuel G. Camp, which the Macmillan Company has published for the instruction and delectation of the Waltonians. This book seeks to present the latest information about developments of rods, flies and other tackle as well as how, why and when to use the dry fly. Mr. Camp writes out of a wealth of personal experience. The book is listed at two dollars.

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Please send me the number of trees indicated on the dotted lines beside each variety, with the understanding that every tree is guaranteed to live. If payment is not enclosed you may send C. O. D. (\$5 per dozen, \$18 per fifty, \$35 per hundred.) If you want a fully prepaid shipment please add 10% for delivery.

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Corner of an informal tree garden back of a suburban home—planted six months before photograph was taken, at a cost of \$10. With little care these trees will be worth many dollars more in a few years.



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GARDENING IN THE NORTHLAND

(Continued from page 321)

become deservedly popular,—the mock orange and the hawthorn

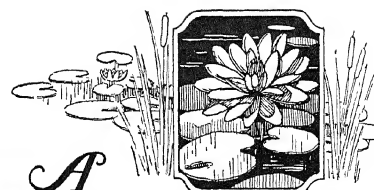
Conventional or formal gardens have never been popular in the lake states, and today, more than ever, is the period of striving for naturalistic effects. Even the farmer is wanting to know how he can naturalize the wild flowers in his home yard, and many city dwellers have already succeeded.

Nearly a hundred wild flowers have been brought under cultivation with satisfactory results. A great many have responded amazingly to cultivation, and have been improved by a process of selection. Two striking examples are the black-eyed susan and the orange butterfly-weed. In open sunny situations, success has followed in the cultivation of wild bergamot, evening primrose, and the rattlesnake master, *Eryngium yuccifolium*. In the shade spots many have had unusual success with a dozen native ferns, such as the shield fern, common polypody, oak fern, maidenhair fern, lady fern, woodsia, ostrich fern, cinnamon fern, and royal fern. Some have succeeded also with Dutchman's breeches and with native orchids.

Rock garden devotees have had the best success with wild flower naturalization and have found many species that fit admirably with this kind of garden. Two native cactuses—Rafinesque's prickly pear and the fragile prickly pear—thrive under cultivation. The Indian paint brush, various sedums, beard-tongues, *Pentstemon*, and native campanulas are all at home in our rock gardens. Accompanying ponds will harbor native cattails, blue flags, arrowheads, and pond lilies. Though the northland is in the infant class in rock gardening, this has already become so popular that materials cannot be obtained rapidly enough.

Exploitation of native flowers and shrubs by commercial interests shows that we must make haste to save a portion of that native beauty before it is too late. When a single annual outdoor show draws upon northern Wisconsin for two solid carloads of trailing arbutus for a week's fleeting pleasure, it becomes apparent that Nature cannot forever stand such a drain unassisted. That example is conspicuous only by its size. Florists all over the country are buying regular shipments of trailing arbutus in season. The answer should be its cultivation for a commercial crop. If the demand is for wildlings, then gatherers must be taught not to rob the public domain, but to raise their own stocks. A far-reaching law signed by Gov. Walter Kohler, of Wisconsin last July, makes it a heavily finable offense to trespass without consent of the owner, putting the burden of the proof upon the trespasser. That furnishes the necessary protection to the farmer who wants to grow wildlings, and the quicker he starts using this advantage, the sooner will his lot be bettered. There are frequent examples where the growing of Christmas berries, flat ferns, trailing arbutus, winter berries and orchids of many kinds has been most profitable.

The same story can be told in all three states. People are getting a tremendous amount of enjoyment out of gardening in the northland.



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No garden is modern without the colorful beauty, exquisite fragrance and fascinating interest of a Water Lily Pool. Even small gardens have room for at least a simple tub-garden.

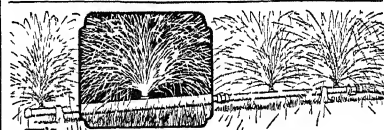
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INSECT LIFE

(Continued from page 323)

trunks A whole story could be written about the beetles which infest a single tree. The black oak plays the host to a succession of insects which cause its destruction by an orderly division of labor and a division of the spoils.

A Buprestid beetle, *Agrilus arcuatus*, is one of the first to start the attack. The larvae bore into the tops of the branches and girdle the twigs. Another species of *Agrilus*, *A. bilineatus*, works in the standing trunk while it is still in its prime and eats out narrow channels under the bark. Then several species of flat-headed borers enter the trunk and feed among the burrows left by the Buprestids.

Such agents open up the tree's defenses to a horde of other insects that soon follow up the attack. The beetle population increases with the advent of the larvae of click-beetles and darkling-beetles. Then when the underlying sapwood begins to rot, millipedes and centipedes, fungus flies and spring-tail invariably join the mob of destruction. Carpenter ants, wasps and bees excavate their nesting chambers from the rotting wood. Finally the combination of physical and biotic agents completes the ruin and the tree is reduced essentially to soil.

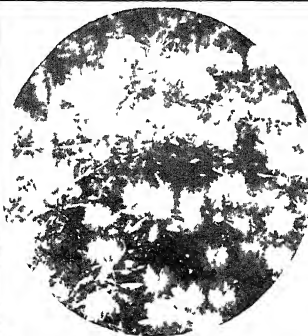
In the stable forest environment, Nature is generous to insect life and offers it an easy existence, but on the sandy, unprotected dune regions conditions are vastly different. On the shores of Lake Michigan and in certain localities in Wisconsin and Minnesota there are barren sandy areas where only such insects can live as are especially fitted for such an environment.

The most conspicuous of the dune insects are the solitary wasps. Here the stocky Bembicids range about capturing flies, and the angular Psammocharids hunt spiders, even dragging the fierce *Lycosa* from its lair. Here *Chlorion* chases grasshoppers and *Ammophila* collects caterpillars. By burrowing in the sand they establish their larvae in underground nests as safe as any cyclone cellar.

Depending on the wasps for existence are the Mutillids or velvet "ants." The male possesses wings, but the female has none. She scurries about on the hot sand, slyly slips into the burrow of a digger wasp and inserts her egg within the cocoon of the defenceless host. Her trade is parasitism.

On the dunes, the wary tiger-beetles actively stalk other insects for their own food, while their larvae sink long straight shafts into the sand and prey upon any insect that steps close to the doorway where a pair of huge jaws is ready for the kill. *Geopinus*, another beetle, ranges the sand only at night. During the heat of the day it lies discreetly hidden lest it suffer the wrath of the Sun God.

These are a few glimpses of insect life in the Land of Lakes. A complete census would reveal creatures of all sorts and dispositions: exquisite children of the air, grotesque devotees of the soil, warlike waifs and peaceful sprites, shy ones, bold ones, good and bad,—to get along with them all is hard indeed, but to get along without them at all—I wonder, could we really manage it?



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MAMMALS OF THE LAKE STATES

(Continued from page 304)

farmer's fields of rodents and other small animals, and sometimes raids his chicken coops The pygmy of the family, the smallest of all flesh-eating animals, only seven inches long, occurs rarely in southern Michigan and southern Wisconsin, and somewhat more commonly in western and northwestern Minnesota The slender form of the least weasel admits it to the burrows of the various meadow mice, and on these it subsists

The beaver, builder of dams, is locally abundant, and of late years artificial transplanting has helped it to reoccupy much of its former range The muskrat and he of the powerful defence, the skunk, are numerous, and along the southern boundary of Minnesota the smaller spotted skunk finds its northeastern limits

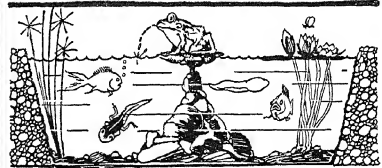
The hard-fighting, thick-set badger, who has lent his name to make a nickname for Wisconsin, where he is fairly common, is also a denizen of Minnesota His habit of feeding on gophers, ground squirrels and other small burrowing animals more than balances the damage he causes by digging treacherous homes in roads and farmlands, and he deserves the protection he does not get

The cottontails flaunt their white tail-pieces over the entire southern and central parts of the three states, overlapping the range of the longer-eared, varying or snow shoe hare of the northern regions The porcupine, of dour mien, who always seems to be minding his own unhurried business, is an abundant species over the northern parts

Minnesota, Michigan and Wisconsin, in their deep forests along the shores of their lakes, and throughout their plains and farmlands, harbor a host of smaller mammals, not so prominent as the larger members of their class, but still considerably important in an economic survey The white-footed or deer mice, jumping mice, pocket gophers and voles are common over the entire area

Several species of semi-terrestrial, semi-arboreal squirrels abound The noisy, complaining chatter of the red squirrel, or chickaree, is a common sound of the woods and forest life Those animate volplanes, the flying squirrels, are found over the entire section, a larger form occupying the northern parts

Side by side with the squirrels are found the chipmunks of two species—the gray



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striped over the entire territory and the Lake Superior chipmunk on the colder northern ground. In fact, relative, the thirteen-lined ground squirrel is native to the southern parts of Minnesota and Wisconsin, and is replaced or accompanied by Franklin's ground squirrel in western Wisconsin and Minnesota. The woodchuck, the ground hog of February 2nd fame is widespread.

Among the lesser fauna in the northern parts of the three states must be included several shrews, and that interesting little oddity, the star-nosed mole, burrows his winding passages in every district. The prairie mole is confined to the southern sections.

Of bats there are six: the little brown, Say's, silver-haired, large brown, red and hoary. It is possible that two other more southerly species occasionally may be seen in this area, the Rafinesque and Georgian bats.

The mammalian glory of the dim far-stretching ages before the advent of man has long since past. Giant sloths, elephants, mastodons, camels, llamas, various types of horses, sabre-toothed tigers and the giant beaver of the Pleistocene, *Castoroides*, here once made their home. The remains of the Proboscideans are constantly coming to light in various parts of these states.

The great prehistoric creatures passed, however, because they were no longer adapted to the changing conditions on the face of the earth. But no period of the same length since the Ice Age saw such wholesale and thorough destruction of mammals as did that period opened by the coming of the hunter and closed by the Twentieth Century.

Now, however, the third picture is being formed on the lake dotted tableau that comprises the surface of Wisconsin, Minnesota and Michigan, the picture of a mammalian life prolific, well-protected, of natural resources faithfully replenished and wisely consumed. The artist is a powerful influence. Men call it conservation, the Prophets call it wisdom.

Michigan Outdoor Show

Michigan's first Outdoor Life, Motor Boat and Sportsman's show is being held in Convention Hall, Detroit, the week of April 20. All phases of outdoor recreation are combined in one big exposition, and huge crowds are expected to view the exhibits of boating, fishing, camping, golf, archery, tennis and other aspects of open air sport.

WHERE WHITE PINE ONCE WAS KING

(Continued from page 313)

to five and one-quarter million acres. This movement is putting upon the tax rolls thousands of acres that until recently were bankrupt and paid no taxes.

The national forest program for the acquisition of two and one-half million acres in the region is being gradually carried out. The counties in Wisconsin are turning their tax-delinquent land into county forests. The states, particularly Michigan, are blocking up their holdings of state forests. Michigan leads all the other states in



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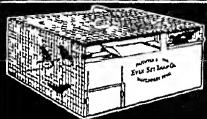
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a program of reforestation. Some forty-two thousand acres have already been planted by the state, and ten thousand acres are added annually. Several pulp and paper companies in Wisconsin have started on a program of reforestation. Even the lumbermen, under the more liberal forest tax laws now enacted in all three states, are turning toward selective logging as a means of perpetuating their forests. All three states are taking an inventory of their lands. The public sentiment is strongly behind the national and state forest programs, and is aroused to the need of liquidating the cut-over problem.

Out of all these efforts there is arising a new forest in the region. It will probably never be like the virgin forest. At first it will be a forest of aspen or jack pine. These trees already yield wood for pulp, fence posts, railroad ties, and box lumber. As time goes on and the forest now being planted approaches maturity, industries using its products will develop throughout the forest region, just as industries grew out of the old lumber industry. These industries, however, will be built to stay, because, taught by the bitter experience of the past, the new forest will not be destroyed as the old was, but will be handled on a permanent basis. The balance of Nature destroyed by reckless cutting and fires will be re-established. The forests will become again the home of wild life. They will restore the disfigured beauty of the northland and will furnish more and more a quiet refuge for the busy man from the city with its noise, bustle and worries, characteristic of modern existence. They will help regulate climate and guard streamflow. They will be the backbone of the recreation movement.

This transformation of the desolate cut-over land of the region is just at its beginning, but its future is full of promise. It is bringing out a new type of leadership and a new pioneering spirit, not the leadership of the past which was bent upon "opening up" new country and "developing" new resources regardless of consequences, but the leadership for creating new resources and carefully husbanding them for permanent use.

FINS OF THE INLAND SEAS

(Continued from page 317)

summer visitors have gathered in growing numbers around the shores of the lakes, penetrating even to the remote water bodies of the vast northern tracts made desert by the lumberman. The money left behind by the summer tourist is reckoned in terms of millions.

Before the white man came, fish abounded everywhere. All the lakes and streams were choked with finny denizens, as are today the few virgin waters that remain to relate the story of the past. But the white man has wrought fearful changes. In the Great Lakes the fishing industry now faces ruin.

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Many species that once supported lucrative fisheries are extinct. Only the high price paid for all fishery products sustains the industry. Once coming along the shores supplied the demand but since about 1840 the history of the fisheries has been marked by the continued improvement of gear, by the catching of smaller and smaller fish, by the extinction of species whose numbers, like the trees of the forests, were considered inexhaustible, and by the exploitation of species originally considered unfit for food.

In general, unrestricted fishing has been responsible for the decrease, there has been no limit on the number or size of fish that could be caught nor on the time of the year they could be taken. There are now bag limits, size limits and closed seasons that apply to streams and inland lakes, but commercial fishing is restricted virtually only by laws governing the size of the fish that may be sold.

Coupled with these agencies of destruction is another more powerful still—the poisoning of the water. In lumbering days the streams were modified to transport logs and very often they were choked with sawdust. Later with the growth of cities the dumping of sewage, frequently laden with deadly industrial wastes, has made foul and barren once beautiful and productive water courses.

There is an awakening interest in the conservation of these resources. Protective measures are growing and are being enforced. Much money has been spent in restocking the waters and some success has been attained. With the adoption of intelligent procedure in such activities further successes may be hoped for. The ultimate that the conservationist may look forward to is within his vision. That achievement in the end may be disappointingly little and only ceaseless struggle can maintain it.


ACRES OF SUNLIT WEALTH

(Continued from page 327)

and Federal lands. Though Minnesota has spent as much as Michigan on her parks, her lack of definite plans and standards has left her with the poorest park system of the three states and several low-grade parks. She needs a state survey of the park situation, and many consider that she would be bettered by the concentration of park supervision in the hands of a responsible executive who can advise the Commission with expert knowledge and give full time to the development of a proper system.

Wisconsin's State Board of Forestry was established in 1905, and before the Supreme Court prevented further acquisition of forest lands in 1915, it had set aside more than 150,000 acres. A Conservation Commission of six members appointed by the Governor, serving without salary, took over its power in 1927. This Commission supervises the work of a Director of Conservation and a Superintendent of Forests and Parks. A

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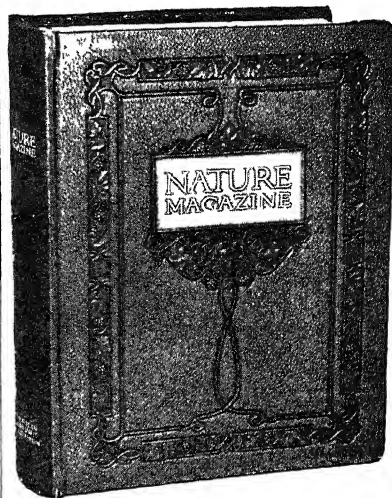
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definite policy, strictly adhered to, that only unique, outstanding and historic areas are of park status, has meant that the eleven parks of the State are all areas of great natural beauty, offering the best in fishing, hunting, camping and other forms of recreation. Lands may be acquired through purchase, gift, and power of eminent domain. Contracts with landowners by which the state may control their land may be made. Further acquisition is restricted only by the degree of generosity of the legislature. During the past two years, however, three important legislative measures have failed. They were bills for the creation of the 7,800 acre Northern Lakes Park, in Sawyer County, the Seven Pines Park, in the North, and the Kettle Moraine Park, which includes rolling wooded country and beautiful lakes. Even with these reverses, however, Wisconsin's park system is rapidly taking excellent form.

No state in the country, except New York, has given greater support to its park system than Michigan. It has been a pioneer in the field. In 1919, it established a State Park Commission of ten men to serve without pay, and arranged their terms of office so a large majority of experienced men would always carry over. When the Department of Conservation, headed by a commission of seven appointed by the Governor with the Senate's advice, was established in 1921, the powers of the State Park Commission were transferred to it, and a Superintendent of Parks hired to advise and administer. The Department has probably as broad powers as any conservation group in the country, for it can sell, purchase, exchange or condemn lands of its own authority. Since its creation, it has acquired sixty-six of the sixty-seven Michigan parks, and now controls 1,000,000 acres of land. All the additions made were achieved not through purchase alone, but through gifts or transfers from delinquent land supplemented by purchase. Michigan's system has been inexpensively built. She alone has a division for state parks in her government, and a full-time superintendent.

Practically every variety of natural scenery found in the state, except Upper Peninsula virgin forest land, is found in Michigan's parks, and efforts are being directed to make up the lack, as well as add park frontage on the Great Lakes, several sand dune areas on the lake shore, large areas of swamp and lowlands to conserve wild fowl and migratory birds, and a 20,000 acre tract in the Porcupine Mountains. Another proposed park of large size includes the Pictured Rocks along Lake Superior.

President Hoover once said, "The day is coming when there is going to be a premium on solitude. If a man can find a piece of land anywhere in this country where he can't hear a bell ring or a whistle blow, that's the place he'll want for a home." The Lake States cannot provide such homes, but they can provide such camp-spots. Minnesota has hardly tapped her park resources, Wisconsin is just beginning, and even Michigan, the most mature of the three, has yet much work to do. But even now these Lake States have given generous guarantees to their citizens, by their park systems, that the time will never come when a man cannot find solitude within their borders when he wants it.



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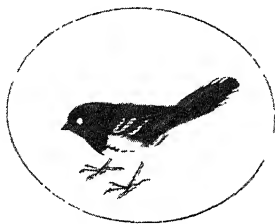
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THE EVENING SKY IN MAY

(Continued from page 324)

magnitude star, Alpheratz, stands conspicuously alone some distance south-east of Regulus. The interesting little quadrilateral of stars known as Corvus, the Crow, one of the Riders of Hydra, is now conspicuous in the south and next to it on the west is its less noticeable companion, Crater. The Cup. The Big Dipper is seen at its best in May for at this time it lies on the meridian at its highest altitude above the pole. Cassiopeia and Cepheus, so prominent in the northern sky in winter, are now below the pole close to the northern horizon.

Mercury may be found in the north-western sky in the evening twilight during the first few days in May but it is approaching the sun and will soon be too close to the horizon at sunset to be visible.

Venus is now a brilliant evening star in the north-west in Taurus. Jupiter is also in Taurus and will be found a few degrees to the east of Venus early in May. The two planets will be in conjunction on May 17 when Venus will be due north of Jupiter and a little over a degree distant from it.

Saturn is now in Sagittarius and will be found nearly due south shortly before sunrise. Mars is in Pisces and is low in the east at sunrise.

LAND OF LAKES—HOW AND WHY

(Continued from page 331)

those of the south. The surface was rough in many parts before the ice sheets rode over it, in fact, semi-mountainous. While the ice tended to smooth off this surface, it was only partially successful. Instead of hundreds of feet of glacial drift covering the hard rocks as in the south, the deposits in this northern region were thin in most part, so that the ancient rocky base is exposed over great areas. Lake basins were hollowed out of the rock, it is an area of glacial erosion, in contrast to the heavy deposition found to the south.

In terms of the geologist's conception of time, the last glacial encroachment is very recent. But many things have happened since the withdrawal of the ice, to prepare this region for human occupation and to differentiate its parts. Forests have grown and have been replaced by other forests of different character. Prairie grasses have thrived through thousands of years. Through the interaction of glacial deposits, vegetation and climate, soils of great variety have developed. Man's rapid conquest and exploitation played their parts in the changes which have arisen. Yet just as time will chisel new lines on a sculptured face, yet not change the features carved by the sculptor, so have post-glacial events altered but little the general outlines of surface left by the ice.

The four pages of colored bird pictures by R. Bruce Horsfall, previously announced to appear in June, are being scheduled for July, mechanical difficulties having prevented their inclusion in the earlier number.



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PHOTOGRAPHIC DEPARTMENT

(Continued from page 282)

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Hiawatha Land


The Upper Peninsula of Michigan, part of the setting for Longfellow's poem, *Hiawatha*, is just as wonderful and varied as it was when Gitche Manitou, the Great Spirit, established his home on the tip of Sugar Loaf on Mackinac Island, writes Aaron Lowenstein, prize winner in the *Times* Essay Contest, in the Upper Peninsula Development Bureau *News*. Since the days when Hiawatha lived out his life with Minnehaha in peace and happiness by the shores of Gitche Gumee, the Big-Sea-Water, when Pau-Puk-Kewis sped westward toward Munising "to the pictured rocks of sandstone" great changes have taken place. The Indian no longer roams the forest, for both the Indian and the forest have largely gone, instead, it is the visitor from other states that the Upper Peninsula lures to fish its streams, enjoy its parks, and to gain health and contentment amid its scenery and invigorating air. It is estimated that 92,000 automobiles entered the peninsula from St Ignace alone in 1927.

Women Clubs Active

The Minnesota Federation of Women's Clubs, of which Mrs P J Schwarg of Dodge Center is the former Conservation Chairman, is one of the active conservation forces in the North Star state, and began work, twenty-five years ago when it was instrumental in saving forest lands in the northern part of the state by urging the establishment of a state park. Though handicapped by lack of funds, it has carried on rigorous educational campaigns, planted living Christmas trees, memorial trees and memorial forests, and has worked to prevent the flooding of lands in Superior National Forest. A record in tree planting was established by a St Paul Club which set in the ground 93,990 fruit-bearing shrubs in cooperation with the Park board.

Bird Pictures

A series of colored bird pictures of post-card size has recently been issued in sets of sixty by the National Museum of Canada, at Ottawa, Ontario. Each card contains descriptive notes on the species illustrated such as size, color, range, habitat, distinguishing marks and characteristics.



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Wisconsin Conservation

Wisconsin, whose Conservation Commission of six members was established in 1927, is one of the leading states in conservation policies. During the past three years more progress has been made than in any similar period before, according to Duane H. Kipp, Superintendent of Education and Publications.

Among the accomplishments Mr. Kipp points out are the adoption of a new forestry policy destined to replant Wisconsin's idle acres, the development of a game farm growing mammals and birds, an extended fisheries policy which includes the rearing of fish to larger size before distribution, and a new state park policy that emphasizes the educational uses of state park lands. Law enforcement, in addition, he asserts, is more efficient, and public opinion, under the influence of an efficient public relations department, is swinging more and more toward conservation ideals.

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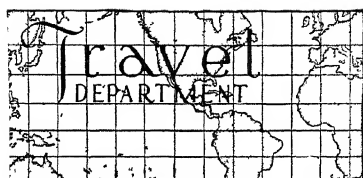
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June is the month of decisions. After looking over all the literature on where to vacation and what to do, the time has come for shutting one's eyes and sticking a pin through the map to determine one's destination. Let us hope, however, that some part of United States or Canada, preferably out where the mountains grow high and the open spaces are still open, will be the part pricked by the pin.

* * *

The Canadian Pacific Railway informs that an open-jaw tourist arrangement between Glacier Park, Banff and Lake Louise will be in effect this summer. This enables a traveler to take advantage of round trip rates on lines which run parallel to one another, the Canadian Pacific and Great Northern. The fare will be based on one half of the Glacier Park round trip fare plus one half the Banff-Lake Louise round trip fare, plus \$27.75, which is the fare from Glacier Park to Banff, or \$28.75, that from Glacier Park to Lake Louise. These fares are in effect only via the Soo-Canadian Pacific via Portal or Emerson and the Great Northern-Canadian Pacific via Winnipeg.

* * *

One of the most interesting organizations that have sprung up in connection with travel has been the Trail Riders of the Canadian Rockies, an association of outdoor lovers who promote the fellowship of saddle and camp amid the snow-clad peaks. Qualification consists of an established record of not less than fifty miles on horseback or on foot accompanied by a horse over trails in the Canadian Rockies. The president is J. M. Wardle of Banff, and J. M. Gibbon, Room 324, Windsor Station, Montreal serves as secretary. The booklet issued by the Association describes many of the interesting trips which can easily be taken on horseback through Yoho, Banff, Rocky Mountain and Kootenay Parks, and has many helpful hints for use on the trail.

* * *

An American organization promoting the beauties of the Canadian Rockies is the American Express Travel Department, whose "Lariat Trail" tours have become famous in recent years. These start from Chicago, travel to Lake Louise by way of Minneapolis, Moose Jaw, Medicine Hat and Calgary over the "Soo" line, motor through Rocky Mountain Park, Kootenay, Yoho and Banff Springs, and return to the States once more by rail. These tours, while not including much hiking, or riding, provide for six free days in which one may play around the peaks and valleys golfing, swimming, climbing or in the saddle. The trips are priced at \$295 Chicago to Chicago, for one person with lower berth Pullman accommodations.



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Jasper Park, the largest National Park in the world, is rapidly providing accommodations for the outdoor lover, much in the manner found so successful in Glacier National Park This spring saw a reconditioning of all trails The chalet at Maligne Lake is being enlarged, we understand, and tent-camps will be put in at Shovel Pass and in Tonquin Valley if the number of travelers warrants Genial Fred Brewster, of Brewsters, Ltd a firm of brothers who have lived through the days of opening up Canada's Rockies and played a prominent part in making them well known, is at Jasper, Alberta, to provide, within reasonable limits, any degree of accommodation for friends from the "States"

* * *

Grasshopper Glacier, concerning which W C Alden writes in the present issue, is one of the many phenomena of interest associated with the outskirts of Yellowstone Park, itself too well known to need boosting The Thoroughfare Country, fringing the park at the southeast is another This is a marvellously wild section, mostly over 8000 feet high, supporting one of the largest moose herds in America and an abundance of elk and furbearers Here is an open space that will delight the most civilization-weary

* * *

Many people, reading Arthur Newton Pack's southwestern adventures in this number, may wonder about the possibilities of their duplicating his trips While years of training are necessary to develop knowledge of where to find the wild life and how to photograph it, yet no great deal of experience is required to enjoy the same scenery and the same type of leisurely travel This department will be glad to furnish readers on request a copy of Mr Pack's itinerary, and help plan a trip to the Southwest Much of the American Nature Association Grand-Canyon-Bryce-Zion trip, as listed in "On Western Trails", will also cover this country thoroughly

* * *

Billboardless Hawaii has other attractions besides the absence of "buy-ways", and June is the ideal month in which to visit it (See Nature, June, 1929) Kilauea and other volcanic peaks have lately been acting up, and promise, with fair degree of assurance, displays for the visitor All the islands are bedecked with their handsome summer garments, and the mountains, still in the exuberance of spring, are at the height of their beauty The Los Angeles Steamship Company, and the Matson Line, with offices at San Francisco, offer a number of tours to this land "that has all things"

* * *

If any senior in the larger Eastern colleges has not been to Europe, he is apt to discover, just now, that the conversational range leaves him quite out Collegiate youth has gone Atlantic-wild during the past ten years Third Class, once dedicated to the economically deficient, has been dressed up into Student Third, and non-collegians come down from First and Second Class to

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enjoy the hilarity. Student tours through Europe are likewise very popular, and some institutions are giving summer school credits for them. Two of the leaders in the movement have been the Student Pleasure Tours, Inc., a subsidiary of the North German Lloyd lines, and the Student Travel Club, connected with Cunard and the Anchor system. Prices in both company's tours are reasonable, the service is excellent, and Europe is thoroughly, if rapidly seen. The neatest trick of the North German program, in our opinion, is the \$545 trip to London, The Hague, Amsterdam, Brussels, Munich, Oberammergau, Dresden, Lucerne, Interlaken, and Paris, with sailings both ways on the speed-queen, the Europa, and motor trips through the Austrian Tyrol and the Alps. Cunard jaunt No. 7 to eight major continental countries likewise strikes the fancy. But there are no end of others. They all go to Oberammergau, too, this summer.

* * *

A division of travel in the Bureau of Foreign and Domestic Commerce, to help attract tourists to the United States, should be added to the Federal Government, Representative Dyer of Missouri recently told the House of Representatives. Canada and France, he said, lead this country in supporting the tourist trade, and though Canadians spent about \$85,000,000 in the United States in 1929, Americans left more in the Dominion. The Division should make contacts with various types of travel agencies, be responsible for guiding parties of foreign business men through the country, maintain assistant trade commissioners for travel in leading foreign cities, and generally promote the interests of the nation. This worth-while suggestion should be thoroughly considered, since the tourist industry is rapidly becoming one of the most important in the world.

* * *

Sweden has recently abolished visas for Americans, probably in view of the international meetings to take place there this summer. A passport is required, however, except for the Sweden-born. This is another step, we hope, toward the utter abolition of the visa requirement. Already Belgium, Switzerland and Italy have done away with the visa, and in France, Denmark, Germany, Japan and several other important countries, it is issued gratis. It has proved to be mainly a waste of time and a cause for trouble. The United States has pending in Congress a bill which will permit the Secretary of State to renew the passport without charge. Formerly, though costing \$10.00, it expired after two years. If legislation, obviously aimed at the immigrant but hitting the tourist, which creates the \$8 head tax required of countries with which reciprocal agreements regarding visas and passports have not been negotiated, can be repealed, a great step forward to help tourists and the tourist business will have been taken. Americans travelling in Europe during the past ten years have had to pay as much as \$100 in visas, and visitors from England and other countries with which we have no reciprocal arrangements have been similarly affected in the United States. The tourist business is too important to be held up by regulations that serve little or no purpose.

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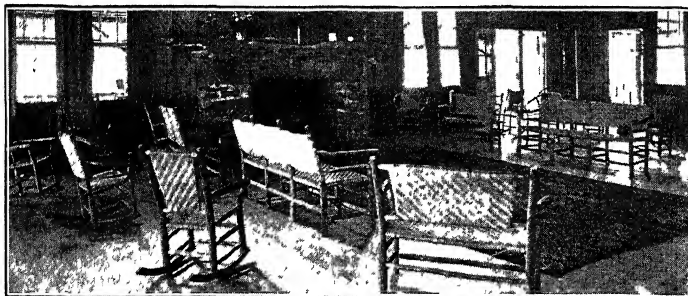


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NATURE IN PRINT

On the Low-Veld

To us, least, there is always a fascination in the word "veld." It conjures up pictures of a far country to which we have always yearned to go—and will, some day. Hence we seized with pleasure *The Low-Veld, Its Wild Life and Its People* by Lieut. Col. J. Stevenson-Hamilton. The Low-Veld is that section of the Union of South Africa bounded by Southern Rhodesia, Portuguese East Africa, Swaziland and Transvaal Province. It is a land rich in flora and fauna and in history. The animals in the zoo which most interest us are the lovely horned mammals of South Africa, zebras and other forms of different and exotic character from that part of the world. Now comes Colonel Stevenson and makes us ache to be away and discover whether we cannot see and, perhaps, photograph a giraffe in its native haunts. To all who may have a similar urge we recommend this book, which is published by Cassell and Company, London, and Toronto.

Chief Pokagon

Chief Pokagon, friend of the white man, and recorder of Pottawattamie legends, wrote no more beautiful tale than the Pottawattamie Book of Genesis, which describes the Indian story of the beginning of things. C. H. Engle, a publisher at Hartford, Michigan, has had this little legend reprinted on birch bark, making a very attractive souvenir.

Biological Survey

No other organization of government so closely deals with Nature as the Bureau of Biological Survey, and Nature lovers and conservationists everywhere will be interested in the carefully prepared history issued by the Brookings Institution from the John Hopkins Press. Jenks Cameron is the author, and he has compiled as thorough a report as his previous monograph on the Development of Forest Control in the United States. The book is priced at \$2.00.

Back on the Farm

Among the spring books, *Old Doc Lemmon* will probably do more than any other to recreate days spent on the farm. It is a rambling, unpretentious monologue told by an old country "hoss-doctor" whose years have been close to the earth, and set down by the chronicler, Robert S. Lemmon, who is able to catch the pith of the philosophic observations in very presentable dialect. It is filled with the calmness, solidness and peace agricultural lands, especially if they bring a fair living, always create in the people dwelling on them. It is published by the Midwest Company, Minneapolis, at \$2.

Along the Shore

It was along the margins of the ancient seas, when the world was young, that life began. Between the reaches of the flood and ebb tides, the earliest forms of plants and animals were born, later to adventure either in the deeper waters off the shore, or up on dry land, above the ocean's swell. And today, many of the primitive types still exist in the shallows near the land, to furnish evidence of the vital history of living things. Some of these have engaged the pen of Lya L. Butler in her recent book, *Along the Shore*, published by The John Day Company, New York, at \$1.25. In the neat pages, one will find the sea urchins, the sand dollars, the various members of the crab family and the sea anemones living as harmoniously in print as they do along the sands. Miss Butler has illustrated her writing with many drawings, and gives directions for collections and the preparation of aquariums. The book is in handbook size, and makes a useful accompaniment to a seashore trip.

Wealth of the Sea

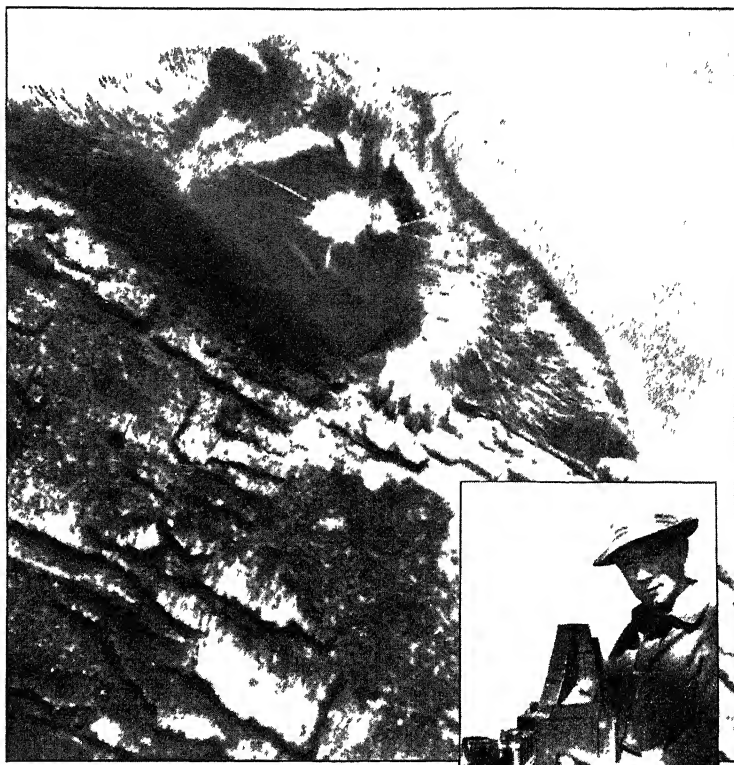
The economics of the sea are filled with romance and adventure. The picturesque whalers, the courageous pearl-divers, the interesting oyster fishermen and untutored South American sea-salt manufacturers, the grizzled Gloucester fishermen—all the types of humans that reap the harvest of the deep for others to enjoy have a quality of glamor mere landlubbers do not possess. *The Wealth of the Sea*, by Donald K. Tressler, just come from the Century Co. press, has much to do with these people, and with the manifold products of the five oceans. It is a well written compendium of information on all the industries based upon oceanic animal or plant life, and besides being a valuable reference book, it is well worth reading to gain an understanding of the important part salt water, covering 70 per cent of the globe, plays in our lives.

Newell's Animals

David Newell is at once the author and the illustrator of an interesting little book of verse entitled *American Animals*. In simple poetry he presents the outstanding facts about the life habits of our mammals. Each poem is illustrated with line drawings of the subjects and there is further illustration in the way of four-color plates to the number of ten. The publishers are the P. F. Voland Company of Joliet, Illinois. The blurb does not reveal the price of the book. (Soon we will start on our one-man campaign to compel publishers to print the retail price of their books together with their complete addresses in some permanent part of the volume.) Albeit, Mr. Newell's book is an attractive little volume, whatever the price.

Indian Corn

The latest addition to the excellent and interesting leaflets brought out by the Field Museum of Natural History, Chicago, is one entitled *Indian Corn*, written by James B. McNair, assistant curator of Economic Botany. The booklet discusses its origin, geographical distribution and varieties, its uses by the American Indian, and modern industrial and experimental products. It costs 25 cents.



RICHARD K. WOOD

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In *Physical Culture Magazine* Mr. Wood tells how his Graflex "made a new man of him," kept him out of doors and transformed him from an ailing, weak youth into a hardy and healthy man of the open. He has not needed the services of a physician for the past ten years. Graflex has brought him a remunerative hobby—and it has brought him health.

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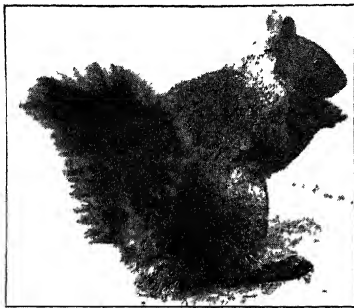
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INTEREST in colored film has grown tremendously during the past few years, and while several excellent color systems, notably the one put on the market by Eastman, are on the market, many people who cannot avail themselves of these may do their own coloring at little expense and with much enjoyment. With a little practice, several feet of film can be colored in a few minutes. The positive, not the negative, of course, receives the treatment.

"In order to facilitate the work," says *American Photography*, "the ciné colorist should build a long coloring box, 30 inches long, six inches deep, and six inches wide. The interior of the box should be illuminated by two Mazda lamps—25 watt lamps are sufficient—below which may be placed a glass mirror. The top of the box is covered with a sheet of ground glass. As the film passes over this glass top, it is well to have some means of keeping the film in place, in a straight line. Two strips of wood can be used for this purpose, which are separated so that the film can slide easily between them. The edges of the strips should be taped so that the film does not get scratched in passing. This box will serve to illuminate the section of film being colored, and forms a convenient stand upon which to work with the brush.

"The materials needed are few and inexpensive. A good assortment of water colors, slabs, wells, and brushes being practically all that is needed. Red sable and Jap-Art brushes are recommended. In the sable brushes, a one-eighth and one-quarter inch, each with flat, chisel edges will be found most useful. In the Jap-Art brushes, the popular L-1, D-1, D-3, and N-1 are fine for detail work, while the sables are used for larger areas, such as sky and water.

"To begin with, about five colors should be prepared. It is important that enough color be mixed to complete the film. The usual procedure is naturally to color the film, one color at a time, throughout the length to be colored. Each time a new color is used, the brush should be rinsed in clean water. This is important. The degree of depth must be decided by the colorist, but it must not be forgotten that in coloring lantern-slides and ciné film, the color must be deeper than usual, because, on projection, the colors appear lighter. Colors prepared especially for this work will not block out others, and where two colors meet, there is no running in."

Such colors may even be superimposed without danger. The brush must, under no circumstances, be overloaded, for this will often blotch and spoil the film. The emulsion side of the film receives the color, and the film should be kept as clean as possible. If the film repels the color, sponge over it with a soft sponge moistened with a weak solution of sizing. If the work is faulty, the paint may, of course, be washed off, and the work done over. Many rainy afternoons can be spent enjoyably with such work, and the results will be a matter of much satisfaction to the worker.

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The Eastman Research Laboratories has helped answer a query recently made to this department regarding the preservation of Ciné-Kodak film. The film, we are told, will undoubtedly stand up for many years, just as the first Eastman Motion Picture Film, which is still in a good state of preservation, has done. Pictures of President Roosevelt, taken at the time of the Peace Conference at Portsmouth, N. H., which ended the Russo-Japanese war, are still in fine shape, and the same care used in making these films has been put into Ciné-Kodak. The best way to preserve the film, however, is to have a duplicate copy made before the original has been projected often enough to become scratched. This duplicate is for general use, and the original may be stored in a safety deposit vault or in a Kodascope Humidor, to be taken out only twice a year for examination on a rewind or for making duplicates. When film becomes brittle, moistening the pad in the humidor with water will correct the condition.

* * *

A new amateur movie camera with visual focussing finder has recently been put in the market by Victor Animatograph Company. This is Model 5 Victor Ciné-Camera, a three-lens turret instrument, the lens in which may be turned to the finder position, thus enabling the photographer actually to observe an image which corresponds in size and focus with the one that will be exposed. Each scene may be individually focussed without attention to the focussing ring, except to produce finally the sharpest possible focus. This feature renders the use of fast lenses more practical, and insures absolute accuracy in securing even close-ups.

* * *

The Victor Company have also compiled a directory of 16 mm film sources, which they are supplying free on request directed to Film Directory Editor, Victor Animatograph Company, Davenport, Iowa. A tabular style of listing also helps to show the kinds of films available from any one place, and reels are designated as being appropriate for school, church, professional or entertainment use.

BEGINNING with our July issue a new Photographic Department, edited by an authority and illustrated, will be offered to our readers. This department will be given full page space and we trust that it will be of service and that our photographic readers will avail themselves of its special services.

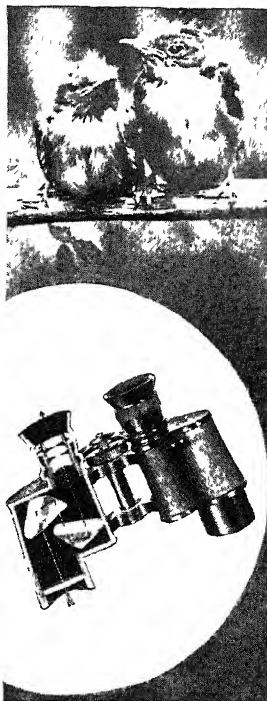
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PUBLISHED BY

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To Stimulate Public Interest in Every Phase of Nature and the Out-of-Doors, and
Devoted to the Practical Conservation of the Great Natural Resources of America

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*Nature Magazine, past and
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er's Guide in your library*

NATURE MAGAZINE is published monthly by the American Nature Association
Entered as second-class matter May 31, 1927, at the post office at Washington, D C
Additional entry at Greenwich, Conn
Publication and Editorial Office, 1214 16th Street, N W, Washington, D C
Additional Offices of Publication, Greenwich, Conn

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back pages of the magazine*

THE POTOMAC AND POWER

An Editorial

POWER, legitimate in its sphere, has once more set itself at cross-purposes to the wishes of the People

The struggle now is over the historic and beautiful shores of the Potomac River from Mt Vernon, Washington's famous home, to Great Falls, the Capital's greatest scenic asset. The people, expressing their wishes in the Cramton-Capper Bill, which has now passed the House and been reported out of committee in the Senate, want this area as a public-owned parkway, to preserve the beautiful gorge of the Potomac, the scenery and wild life along the twenty mile stretch.

The Potomac Power Company, controlled by the Byllesby interests, wishes to defeat the bill. Their eyes are on the 3,000,000 kilowatt-hours of power per annum which the river might develop. They cannot, at present at least, get a permit to build dams below and above Great Falls should the measure be made law.

Even though amendment to the Parkway Bill specifically provides that acquisition of land for park purposes shall not debar its use for the development of hydro-electric power when Congress deems it necessary, they still are trying to prevent its passage. They feel—and rightly—that once the public has learned to appreciate fully its heritage of beauty embraced by the shores of the Potomac, none can exploit that heritage.

The plans for the parkway, as developed by the National Capital Park and Planning Commission, include the beautification and preservation of both shores of the Potomac, and the establishment of a highway closely following the river from Washington's home to above the Falls. The lower part of the river is lakelike. The shores on both the Maryland and Virginia sides rise gradually into beautiful farm and meadow land. But farther up, just above Georgetown, the river narrows. Rocks appear in the stream bed, the shores rise precipitously in cliff-like palisades, rapids foam noisily. At Little Falls, a visitor can more easily imagine himself in western mountain country than in the midst of calm eastern farmlands. The climax to the crescendo of wildness is reached at Great Falls, where the Potomac divides in two main streams, and boils and tumbles down a forty-foot drop—one of the most beautiful falls in the East.

The rocky contour of both shores, the deep glens, steep banks and cliffs that adjoin the Potomac are utterly different, scenically, from any other spots along the Atlantic borderland. Historically, they are priceless. Along the Maryland side sluggishly flows the Chesapeake and Ohio Canal, picturesque for its lockhouses and its memories. On Virginia's

shore are the remnants of the Potowmack Canal, blasted out under directions by George Washington. Near Great Falls are the sites of the First President's foundry and the massive locks of his first canal. Civil War and War of 1812 history was made here. The Bill will preserve these spots.

Washington is soon to spend \$300,000,000 on beautification. The same measure authorizing the parkway contains provisions for an outlay of \$16,000,000 additional to supplement the park system of the District of Columbia. The goal is the creation of the City Beautiful, worthy to be the Capital of a Nation endowed with more natural beauty than any other country in the world. The Cramton-Capper Bill provides the setting, which is as necessary as the jewel itself.

The power people offer many promises in return for defeat of the proposed law and the issuance of a power permit. For instance, they will supply a park of their own, and assure at least 500 second-feet of flow over Great Falls. They will construct their buildings in keeping with the surroundings, construct two free bridges across the Potomac, and prepare part of the river for ultimate canalization to the Ohio.

Even if kept, however, these promises would not give the public what it desires. The best display at Great Falls takes place when 7,000 second-feet go over the rocks. The two lakes extending over 24,600 acres will cover many of the interesting glens, rock formations, and species of plant life. They will be but artificial bodies of water destroying the naturalness of the scenery and the beauty of the gorges of the Potomac.

And is power necessary? It has never been shown that the district in reach of Potomac River power is now handicapped for lack of it. It has never been conclusively proved that the present rate of rapid increase of real estate values around Washington will not more than equal the savings supposed to accrue from power development. The Government, by buying the parkway lands now, as provided in the bill, will make a shrewd buy.

The intangible values—and they are the important ones—are on the side of the Cramton-Capper Bill. They involve the millions who yearly flock to Washington. They involve the pride of the Federal Government, which has never made a practice of sacrificing a single aspect of the beauty of its surroundings for mythical savings.

The rights of developing power still remain in the hands of the people, where it belongs. Now they want beautification and preservation.

Pass the Cramton-Capper Bill. That is what the people want!



GAYLE PICKWELL

ON HIS HEAD AND SHOULDERS
IS THE GOLDEN MANTLE

No lovelier bit of animation inhabits
the western mountains than this
charming ground squirrel

NATURE MAGAZINE

Volume 15
Number 6

June
1930



HAROLD A. BULGER

LIKE A FULLY-DEVELOPED CASE OF MUMPS
Ground squirrel photographed at Going-to-the-Sun Chalet by a member of one of the Nature Magazine Glacier Park parties

SOME FOREST SPRITES

Varieties of Western Chipmunks Mean Much to the Outdoors

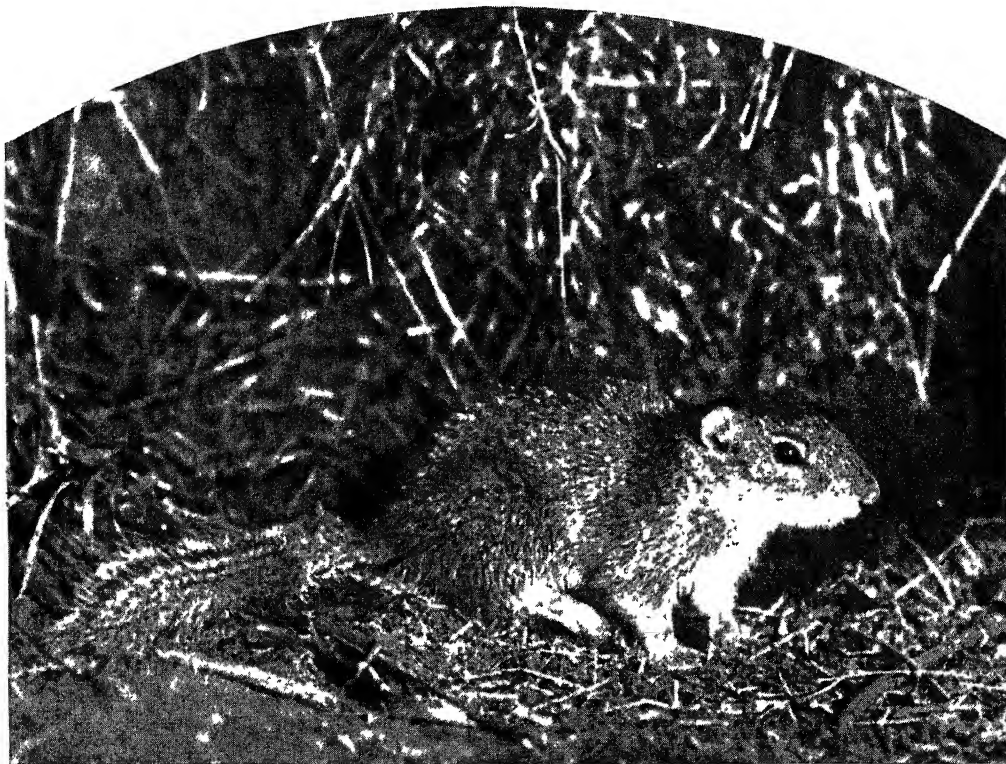
by Gayle Pickwell

AT THIS season the outdoors lures us and all who can yield willingly to its gentle call. Many eastern eyes are turned to the great wild playgrounds of the West; the mountain trails and camps, the birds and mammals and flowers that there abound. And there is one fellow—really a group of fellows—we meet there who is full of charm and fascination and friendliness. It is the bright-eyed, whisking chipmunk. It makes us feel welcome and at home.

In boyhood days in eastern Nebraska the nearest approach to chipmunks was that odd little tremolo whistler of the prairies, the thirteen-striped spermophile, or its larger all-gray cousin, the Franklin ground squirrel. In the forests of northern Illinois I first made the acquaintance of the eastern chipmunk when, trying to locate a

bird with a new note, I came across the maker of the note, a little furry wood sprite on an old log vociferously protesting my intrusion with birdy squeaks and twitching tail. In the hills of New York I met him again and I learned to look forward to the animation the busy-body contributed to every bit of woodland scenery. But though the chipmunk comes to be a part of the forests and copses of the East and is one of the best known bits of life there, it is in the far West that chipmunks have made their greatest developments.

One who crosses the great sage-brush plains glimpses the little striped ground squirrel who, with stubby, whitish tail thrown up over its back, goes loping off in alarm into the brushy cover. This little fellow, called antelope chipmunk, seems desperately afraid for his life. He is



H. H. PITTMAN

wisely so because the great exposed spaces show his movements so clearly to soaring hawks and prowling coyotes. From the plains you come to the wooded mountains of the West—Rockies, Sierra Nevada or Cascades—and there you find other chipmunks. These, better protected by rocks, undergrowth and trees, show less terror of the world in which they live. After the first chattering announcement with which they greet your arrival they

will come to investigate for, where humans tarry, food crumbs seem always to be spilled.

With chipmunks, as with so many other animals—not even excepting the birds—the conditions of the West seem to have made possible or necessary many different species and varieties. The rugged mountain ranges, the great deserts intervening, the regions of heavy rainfall, the regions of slight rainfall have erected barriers that chipmunks could not cross nor leave. So there have developed almost as many species and varieties of these perky fellows as there are differences of environment.

FRANKLIN GROUND
SQUIRREL OF THE
PLAINS AT THE TOP

At the left is the Olympic chipmunk like a little furry zebra with the stripes running the wrong way, while at the right the Columbian ground squirrel investigates the possibilities of provender.

PICKWELL

A. N. PACK





GAYLE PICKWELL

Once there had appeared a type of chipmunk best suited to escape its enemies, perhaps it perpetuated its kind and others have fallen by the wayside. There is something more than coincidence in the fact that in the heavy, damp, dark forests of the Northwest the chipmunks are large and dark and, in the desert and open spaces of the Southwest they are slight in build and light in color. Thus it comes about that where the slightly varying conditions of the eastern United States have made possible but one species and five varieties of true chipmunks, in the West the equivalent group has

fifteen species and no less than fifty-five varieties!

In addition to the many true chipmunks of the West there are several ground squirrels with stripes, colors, notes and actions that, in most respects, make them as much chipmunks as those with which they associate. Indeed, such a fellow as the golden-mantled ground squirrel is marked more like the eastern chipmunk than is the one correctly called chipmunk in the West. Thus, with



ABOVE, THE WESTERN CHIPMUNK TRIES MACARONI

At the left the golden mantled ground squirrel throws discretion to the winds at the call of food, while at the right another sits at his meal for all the world like a paunchy old fellow on a stool

A N PACK

PICKWELL



the many true chipmunks with their nine lengthwise stripes and the many chipmunk-like ground squirrels of the forests with their six long stripes, these woodland creatures become numerous. Also they are somewhat trying when it comes to naming them successfully.

However, no matter how they may differ from the chipmunks of another state or mountain range, the names to be learned in any one locality are only two or three in number. So we come quickly to find that the handsome but paunchy fellow of the mountains of Oregon and Washington is the golden-mantled ground squirrel and the natives call it "big chipmunk." It carries on either side two black stripes enclosing a white, and there is a tawny yellow suffusion over its face and shoulders that stands out in striking contrast to the dark brown of the rest of the body. The smaller, far more alert and cautious squeaker is one of the true western chipmunks, the Olympic variety, which the natives call by the obvious title of "little chipmunk." It has five longitudinal dark brown stripes enclosing four white or gray stripes all of which make it like a little, bushy-tailed zebra with the marks running the wrong way. On Mount Rainier we make the acquaintance of another western chipmunk, a larger, more aristocratic relative of the little fellow. This one, called the Cooper chipmunk, has the nine stripes but the whites are grayer, and the total size noticeably larger.

What a pleasure are these striped fellows! Near Crater Lake we camped beside a snow drift in late June but the morning sun had scarcely thawed our cramped muscles before the chipmunks came to make overtures at friendliness with sprightly appeals for crumbs. We succumbed to the appeal and laid out bread crumbs in little piles. To these the mantled ground squirrels, the "big chipmunks", came first, in confidence that their chubby selves and lovely costumes would meet no harm. Somewhat later the western chipmunks, the little ones, looking slender with their length-wise stripings, speaking agility with their twinkling feet, overcame their greater caution in order to fill cheek pouches with campers' alms.

What a store a cheek pouch holds! Sitting on their hind legs, hunched over, these chipmunks held their bread chunks in fore paws the while they nibbled off particles with feverish hurry seemingly stuffing the pouches with rapid tappings of the nimble tongue. The mantled ground squirrel filled them so full that the

cheeks protruded on either side like those of the lumbermen of this region when they have taken a heavy, double cud of plug.

With pouches filled to capacity the chipmunk takes himself off with business-like speed to some storehouse beneath root tangle, rock pile or under ground. A few minutes elapse while the burden is disgorged and back he comes for another double chew. So business-like is he that, no matter how high the bread-crumble pile is in the beginning, trips will be made so regularly, methodically and rapidly that all will soon be removed. Having exhausted us of extra bread the mantled ground squirrel investigated a frying pan and licked with pleasure the tasty bacon flavor there.

Where campers camp chipmunks learn to investigate every tent site. So sure are they of favor that the big fellows will shortly learn to take offerings from your fingers. Lacking humans to aid them, they work assiduously all day gathering seeds, berries and buds. On Rainier we frequently saw the western chipmunk twenty or more feet in the firs and far out on the limbs searching, apparently, for tender terminal buds.

The western chipmunks are features of the mountains. While the "little chipmunk" will occur well down to the base of the ranges if trees are there he will also make a home in the rock slides above the last of the trees where the marmot whistles and the coney bleats. The mantled ground squirrel likes more open spaces.

We know now, since Eliot Howard wrote his famous book, "Territory in Bird Life", that birds sing not so much to please a mate as to proclaim to the world of other birds that they have staked a claim and others are to stay off. Perhaps it was this urge or instinct that caused a "big chipmunk" to climb a rock beside our tent on Rainier's northeast side, there to stand upright and call his chirping call regularly for many minutes every morning. We suspected that his family was in a rock pile near and this morning tocsin warned other chipmunks of preempted claims.

Chipmunks, like most true squirrels and unlike the majority of mammals, dislike the dark and work in daylight only. Indeed the sun is so important in their economy that they lack much of their sprightliness on cool or cloudy days. For the lover of the woods, the walker on the trails, this is well, for without chirp and chatter, the shining eye and flash of color that these nymphs contribute, the western out-of-doors would be heavy losers.



A GOLDEN-MANTLED IN FULL PROFILE
GAILE PICKWELL
The natives know this chap as the "big Chipmunk" with his six stripes of a ground squirrel



ON THE GRAND CANYON TRAIL

Following the Bright Angel Trail in the Grand Canyon as it winds its way downward through ages of rock formation

From RIM to RIM

Camera Hunting in the Land of the Grand Canyon

by Arthur Newton Pack

Photographs by William L. Finley and the Author

WE HAD come from "The Land that Never Was"—from a wilderness of mesa, desert and arroyo, where only rarely has man ventured to live in scattered adobe huts, where roads are mostly ruts across the face of the waste. We had fought wash-outs, mud and shifting sands. We had dug our way from the beds of swollen creeks. We had climbed to the homes of an ancient and forgotten race at Mesa Verde. We had followed the trail of the rainbow to the very rainbow itself—the graceful arch of Rainbow Bridge. We had struggled through the Navajo country, on occasion talking volubly in sign language. The days since we had turned our cars toward the distant peaks of the Sangre de Cristo Mountains had been filled with adventure, toil and the joy of conquering a "land that never was"; a land filled with many fantasies that Nature, during ages of play, had contrived to rear on the face of the earth.

We were going toward another land where Nature had thrown her mighty and persistent forces to carve

canyons and wash away mountains. Our way led along the Navahopi Road from the Indian country of the Painted Desert, the most fascinating and picturesque of all of the approaches to the Grand Canyon of the Colorado. From Cameron, on the Little Colorado, a narrow, twisting road wound up and up beside rocky

canyons, through the petrified remains of forests of long ago. Now and again the mixed flocks of sheep and goats of the Navajos gave us grudging right of way as the highway tied and untied its own knots. Our car labored up a steep grade while we looked back at the pink and gold tapestry of the Painted Desert.

Then our road turned into a splendid boulevard and we

were riding along the rim of the Grand Canyon which lay beside us, blue and mystic in awful depth and distance. Yet this first glimpse was understandable, alluring. One could grasp it, where later the whole panorama of the Canyon itself seemed beyond human comprehension, so mighty and complex is its grandeur.



WE HAD COME FROM THE INDIAN COUNTRY

There we had photographed them at their tribal dance



AND WE HAD MET THE TRIBAL CHIEFS

As well as youthful members with heavy responsibilities

Night found us at El Tovar, planning our cross-canyon trip of the next day, and, as we arranged for mules and pack animals for our cameras and equipment, who should appear but Vernon Bailey, Chief Field Naturalist of the U S Biological Survey, and his wife, Florence Merriam Bailey, noted naturalist as well as an authority on the birds of the Southwest. With them was Park Naturalist McKee, and we all agreed to meet later in the Canyon below.

By one the next day we were aboard our sturdy, trail-wise Missouri mules and off down the Bright Angel Trail, looking forward to photographing antelope on the Tonto Plateau, half way down. This trail has a reputation for steepness and thrills, and many tourists tell of the propensities of the mules for selecting the outside of the trail there to nibble at a stray flower. Truthfully, however, the mule is more sure-footed than the human, trained as he is to these trails, and he cherishes no more desire than does his rider to go hurtling through space a thousand feet or so.

Upon the Canyon wall as we pass is written the story of the world. Through thousands upon thousands of years the Colorado has carved its way down through the strata. We pass the Kaibab limestone, the Coconino sandstone, the Supai formation and come to the top of the Redwall limestone, the most conspicuous of the cliff-making rocks in the Grand Canyon. All these rocks were laid down as sediment beneath the bed of an ancient ocean, late in carboniferous times. Yet these are the youngest rocks in the Grand Canyon formation.

We dismount and walk when we reach the series of pitches known as Jacob's Ladder, but are soon among the tangled alders of the Indian Garden, where seven pronghorn antelope lie peacefully in the shade. They were brought from northern Nevada by the National



Park Service and are a reminder, at least, of the great herds that once roamed the north rim of the Canyon over toward the Painted Desert country. Today there are only a few and in isolated sections.

The Tonto Plateau is a broad desert shelf, probably too warm in the summer for the successful propagation of an antelope herd. Yet these seven are fed solicitously by the Park Rangers and as camera subjects were chiefly difficult because their curiosity moved them to come too near the camera. We photographed antelope to our hearts' content and then made camp on a grassy spot behind the ruins of an old mining camp. We feasted on bacon, potatoes and canned peas in the shadow of the towering wall behind us.

In the morning, after a few slow motion shots at antelope, we took the Tonto Trail and wound down, in and out of the many cracks which feed the gorge of the Colorado. Cactus with blossoms of pink and rose and magenta

bloomed by the trailside, and now and then we caught glimpses of the great river which had made this Canyon. Soon we joined the Kaibab Trail, the direct route to the Canyon bottom. There was more spectacular going, the trail switching into a tangle of gold ribbon on its way down to the gorge of the Colorado. Across the river below was spun a new steel suspension bridge, supplanting the old one which swung from side to side in the wind and across which one mule at a time was allowed to go. The new bridge is a feat of engineering because every piece of steel and every foot of cable had to be brought down the steep trail from above.

Somehow the granite gorge of the swirling river seemed more comprehensible than the whole expanse of the Canyon. Here we stepped across rock of the oldest known age in the world's formation. We had travelled

down through the ages as our trail wound back and forth. Cenozoic and Mesozoic were left behind in the Painted Desert. The Paleozoic, or old life period, we had traversed, and we were now back to the time of primordial life. Just as we refer to the prehistoric days of human history, so in consideration of the Algonkian rock of Archean times we were almost back to the pre-geologic. Little is known of that earliest stage of the world.

Soon we came to the mouth of Bright Angel Creek and then to Phantom Ranch. A cluster of low stone buildings and frame cabins form the ranch, which serves over-night visitors to the Canyon's depths. There we again met the Baileys and Mr. McKee, and that night we joined in a bat hunt, for it was that which had brought the naturalist to the Canyon's bottom. He had, it happened, shot a chuckwalla for collecting and, since we had heard that the Indians relished this lizard-like animal as food, we determined to try its flesh after Mr. Bailey had carefully preserved the skin. It was gamey and tough and there was a mere sliver of meat for each one. The Indian will have no competition from us with chuckwalla meals.

Next morning we set up our motion picture cameras near some clumps of prickly pear cactus. Two of these cacti appeared exactly alike, but one had pink flowers and the other yellow. The black-chinned and broad-tailed hummingbird showed no preference, however, and we were able to get some pictures of these tiny feathered souls as they fed on the nectar. Later in the day we had remarkably good luck at photographing the courting antics of the

large scaly lizards which were everywhere on the rocks. The female lizard was sunning herself on a rock, while the male hunted insects nearby. Suddenly he ran over to her rock, climbed upon it and began running around, above and beneath her, all the time humping himself up and down like a bellows and blowing out his throat. Then she entered into the dance and they wove and interwove in circles.

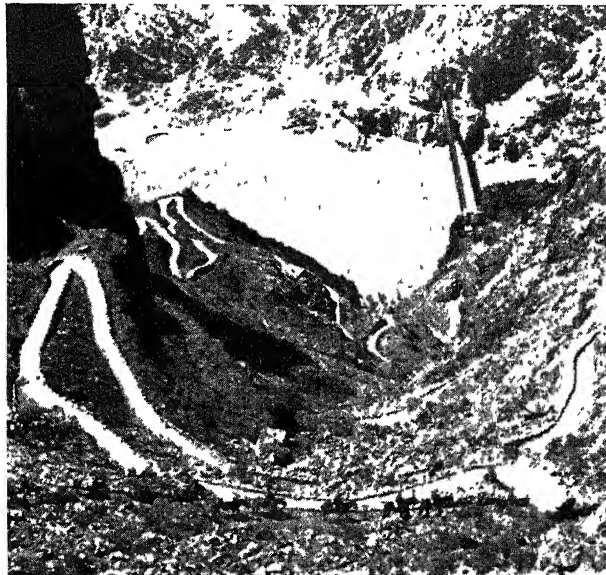
Again that night we sought bats, aided by two well-known motion picture actors. None of us—actors, wild life photographers or naturalists—had any success that night, and the first honors went to the boy who washed dishes at the camp, who garnered two specimens. There is probably a moral there somewhere.

The next morning we mounted our trusty mules again and rode up Bright Angel Canyon. Our guide said that the rushing water contained trout but the fishing season was not yet open, so we contented ourselves with the wild life about us. Just above the Ranch Gambel quail crowed and clucked among the willows, sometimes running across the open. The bees and hummingbirds buzzed about the cactus blossoms. On we rode, following the trail between the steep canyon's walls, upward past Bridal Veil Falls and Roaring Springs toward the North Rim of the Grand Canyon.

This northern rim is about one thousand feet higher than the south rim, and there Grand Canyon Lodge clings firmly. From its terraces the eye again meets so grand and unbelievable an ensemble of giant buttes, gorges and amphitheatres that the mind flags. Only days of contemplation, nights of moonlight and starlight can begin to etch the tremendous

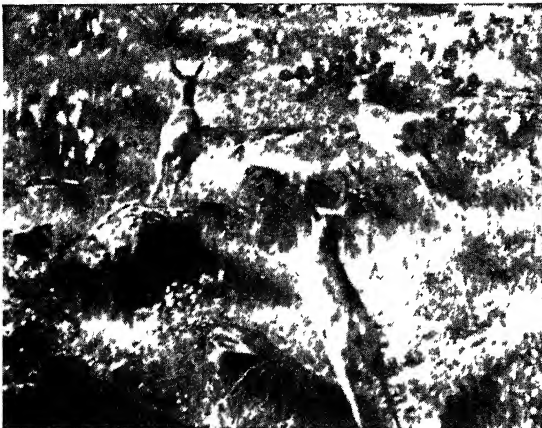
WINDING LIKE A GOLD- EN RIBBON

The trail down to the marvelous suspension bridge across the Colorado



WE MET AND FILMED ANTELOPE

The few animals halfway down the canyon were quite tame and posed well



view upon human consciousness. For this sort of thing there is no preparation, nothing ever seen before can equip the beholder to grasp anything but his own insignificance.

To attempt to understand and absorb this scene requires solitude away from uniformed bell boys and arriving tourists. This the North Rim affords, and so we drove northward toward the Park boundary and turned off to the west on a winding narrow track. At intervals bunches of mule deer surveyed us from clearings, and we risked enough time to try to catch and film a wayside porcupine. On our way again we were surprised to see three coyotes trot leisurely across the road ahead. We stopped and Mrs. Pack commenced to whine at them, dog fashion. She is really good at it, so good that one of the coyotes stopped, sat down on his



ONE OF THE CAREFULLY-GUARDED TURNS IN THE CANYON TRAIL

While there is a thrill there is little danger in the trip down on sturdy, trail-wise mules

GRAND CANYON LODGE, NORTH RIM

The goal of the trip from one rim of the Grand Canyon to the other

haunches, cocked his ears like a police dog and listened. If only there had been more light, it would have made a marvelous picture.

We hurried on and suddenly our road turned abruptly upward against a sky of orange. Two deer stood in perfect silhouette against the sunset, then bounded off. It was a glorious, breathless view from here, whetting our appetites for Point Sublime. Soon we stopped our car and verily this point is well named. Before us in the afterglow lay the Canyon, deep and mysterious in purpling light. The sky, red and orange with rainbow-colored rays, glowed with beauty beyond words. We sat silently as the purple dusk stole up from the west, while the gray and misty shadows filled the gorge and overflowed on the plateau. The moon came out. Life was perfect.

(Continued on page 397)



MR ALBRIGHT'S announcement marks a red-letter day in National Park development, and members of the American Nature Association may feel pardonable pride in the fact that their organization did its bit to save Yosemite trees. The lion's share of the credit goes, of course, to the Park Service and Mr Rockefeller, whose National Park benefactions have earned him an enduring place in park history. Yosemite's friends will also remember Mr George A Ball of Muncie, Indiana, whose \$8000 gift to the government of the important Fassett holding, on Glacier Point Road, made certain that successful negotiations with the Sugar Pine Company would clear Yosemite once and for all.

YOSEMITE TREES SAVED

Public Purchases Endangered Timber

by Horace M Albright

Director, National Parks Service

THE LONG struggle to preserve the magnificent sugar and yellow pine forests in private ownership in Yosemite National Park, marked for early lumbering, has been successfully terminated and the trees saved to the Nation for all time. Recently negotiations were successfully concluded for acquiring approximately 13,000 acres of these private lands in and adjacent to the park.

This is but the first big step in the avowed purpose of Congress to eliminate, as rapidly as possible, all private ownership within national park boundaries.

Visitors of the future, motoring over the Big Oak Flat Road, planned for early construction, will drive through some of the finest stands of timber in the park. Had the timber acquisition not been successful, the road as now planned for location would pass for miles through a devastated area.

That portion of the Big Oak Flat Road outside the park, which also passes through private holdings, is to be built as part of the California state highway system. Its location was established several years ago by a joint location survey carried on by the State High-

way Department, the National Park Service, and the Forest Service. In the agreement providing for the acquisition of the private lands in the park, arrangements were also made for selective cutting on this outside portion of the proposed road. The owners have agreed to use especial care, in their logging operations, to save the finest individual specimens and selected

groups of trees along the roadway. They have also agreed to protect the timber that is left after logging is completed, and to clean up all slashings so as to preserve a presentable appearance.

The purchase price of the private holdings secured for the Government is approximately \$3,300,000, of which half will be defrayed from the appropriation provided by Congress for private-land acquisition. The other half will be contributed by Mr John D Rockefeller, Jr, who has taken such a practical, public-spirited interest in this and other national-park problems.

The Nation owes a debt of gratitude to Mr Rockefeller and to those members of Congress, particularly Chairman Louis C Cramton,

(Continued
on page 408)



A TYPICAL YOSEMITE PARK FOREST

For years the axe and saw have threatened them and, with them, the beauty of Yosemite. At last, however, they have been given the sanctuary their worth deserves by Park friends.



The BIG PICKEREL of PINE RIVER



Being a Recollection of
Days by the Shores of
Fair Lake Ossipee
by
Edward A. Preble

Illustrated by R. Bruce Horsfall

LAKE OSSIPEE, as fair a jewel as ever adorned a setting of green hills, lies in that beautiful basin above which trident-peaked Chocorua stands guard. The evening shadows of the Ossipee Range darken its clear flood, and to the northeast are the low hills of Freedom. Streams whose praises have been sung in undying poetry lose themselves in its waters, while other tributaries of commonplace naming are unknown to fame, though very dear to those whose childhood memories are woven about them. Chief of these is the Pine, and among the myriad incidents that crowd my early recollections of its winding course, those concerning a giant pickerel seem to urge the telling.

More years ago than I care to count three brothers used to spend each summer in Ossipee's paradise of lake and mountain, and take toll of her products. Not of the timber that was stripped from her hills, nor of the crops wrung from the rock-strewn soil that helped to give the Granite State its name, but rather of those intangible yet enduring riches that are ever free to those who cherish them—the evening hymn of the hermit thrush, the gentle voice of breezes filtering through the boughs of soft-needed pines, the splash of spotted trout, the indigo of autumn gentian. These and legions of other dear memories of those joyous visits to the ancestral acres remain to enrich our later years.

Our grandmother, late in life, being long bereft, had

taken to herself a mate, a native of the hills. He was of rugged mould, and strong, but the experience of more than three-score years had taught him the wisdom of moderation. I mention this merely because some had poor opinion of his industry, as

is the custom of those whose wont it is to prescribe in what manner the energies of others shall be spent. But the loving memory of many summer days passed under his guidance urges me to take up his defense. Who among his traducers would have cared to follow where he led us on long tramps over the mountains to haunt of nesting heron or hidden pool beloved of trout, discovered during a long life spent in retracing the boundaries laid down on many an ancient deed? In such loving tasks he gave freely, both in energy and time.

On a certain July day in that long ago Grandpa William took the two oldest of us boys on a fishing trip to Pine River. This meant pickerel—a magic word in our youth. It was, in country parlance, a lowly day, the kind prescribed by custom and tradition as most favorable for fishing, and, moreover, unsuitable for haying. Such days, interspersed among clear ones, seem to afford sure proof that an all-wise Creator did not intend man for labor alone. The hermit thrush, undismayed by an overcast sky, sung his song of praise from the pines, from the tamarack swamp came the clear high notes of the white-throated sparrow, and here and there a veery unwound his strange wild song.



"HIS SUPPLE BODY ARCHED ITSELF FOR A MOMENT, HALF OUT OF THE WATER, AS THE BAIT VANISHED BETWEEN HIS BROAD NEEDLE-ARMED JAWS"

And so, in happy company, and with fishing poles on our shoulders, we trudged along until the village was left behind and we were on the forest-bordered hay-road leading to the river of our hopes.

Pine River rises among the hills many miles to the south, and by the time it nears the lake has become a good-sized stream. Little sediment clouds its waters, but in its course it has drained many a swamp of its moss-stained moisture, and its flood is dark. Now its hurry is over, and as it leisurely winds between high banks the direction of its current is scarcely betrayed save by the slender waving stems of pondweed that point lakeward. Where it emerges from the deep woods and meanders the mile-broad hay meadows that here border the lake, only an occasional thicket of buttonwood or sweet gale, with here and there a swamp maple, overhanging its deep waters in the days of which I speak. Near the lake little reedy ponds and inlets, with sandy ridges between, held the chance of a big fish, and always were the haunts of herons and other interesting possibilities.

Now Pine River was not unknown to us, and hopes were high as we threw our frog-baited hooks into each well-remembered place, deftly trailing them past the tangles of waving pondweed, and along the edges of lily patches that bordered the deeper pools. For a half-hour or so no success whose memory has stood the test of years rewarded our art. But finally we came to a place where a narrow vista between two spreading maples gave access to a pool whose dark depths surely deserved to be the lurking place of some pickerel of more than ordinary note. A circle of lily pads, their floating leaves anchored by stems rooted far below, rimmed a space whose depths had never been revealed to human eye. Amid those broad leafy discs the cups of cow-lilies mingled their gold with the dazzling white star-blossoms of that lovely plant well-named for the water-nymphs who lived in the clear springs of the Mount of Parnassus. But I fear that at the moment I paid but scant heed to the beauties of the river, for my frog-bait had made scarce a yard of its jerky journey across the pool when a great fish, shining with green and gold,

threw himself upon it with a mighty splash. His supple body arched itself for a moment, half out of water, as the bait vanished between his broad needle-armed jaws, and then he plunged back to the shelter of the reedy depths from which he had come. Such a fish the old men talked of, but we boys had never even dreamed that one could still live in Pine River. The radiating waves curled the edges of a thousand undulating lily leaves, and lapped away their strength on the bank at our feet, as a hundred flowers nodded their bright heads on each circling verge. But flower and wave were little noted, for from the depths came instantly the savage tug telling that the time for action had come.

In those days the way of a fisherman with a reel and the lore of gaff and landing-net were known to us only in that vague fashion that comes from the hearing of customs practiced, as it were, by an alien tribe. We had read that some men, after hooking a fish, would allow it to stay in the water and cherish for a time the hope that it might yet escape the barbed death that gripped it. Such a method, however, held little virtue in our eyes. We bore no vengeful feeling against our friends of the water that we should thus prolong the agony of a creature we had, it is true, cruelly deceived, but which we still loved. Besides, the fish might get away. And so it was our habit to lose no time in uncertain and fruitless by-play, but to transfer our prey without delay from its own element to ours. In short, I tried with all my youthful strength to drag that monster out upon the bank, and just when success seemed sure, my line, scarred by the sharp teeth of many lesser fish, parted company with the hook, and the great pickerel slid back into the depths. Why attempt to tell more?

With as good heart as might be borne by those who had suffered such loss, we fished the stretch that lay between this spot and the place where the Pine mingles its dark waters with the clearer flood of the broad lake, beguiling from other pools, with such scant enthusiasm as befitted the occasion, a goodly string of pickerel of lesser size, but we were sure none that might not have been swallowed entire by that lost one. Prob-

ably as usual, we scared up bittorn and duck from the reeds, I have forgotten

It was well along in the afternoon when, on our way up the river, we again neared the scene of the tragedy. That a fish that had fought and run away might forgive and forget was not unheard of, but this one had suffered such indignity that our hopes, though still alive, were low indeed. It seemed to be tacitly agreed that I had had my chance, and had failed, and that to Grandpa belonged the next opportunity. Moreover, he had a patent contrivance, a double-pointed hook that was supposed to spread outward when fairly within the fish's mouth, and to find such firm lodgment as to be surely fatal. So his bait was cast forth, and instantly, to our astonishment, was seized with a rush and a splash, and dragged below those dark depths.

As before the preliminaries were brief, and while the slender pole of rock maple bent almost double in the old man's powerful grip, the struggling monster was lifted out of the water and half way up the sloping bank. Then, when he was almost within our grasp, the patent hook slipped from the bony mouth, and for the second time the great fish was free. "Well, he's gone now," said the old man, with an air of resignation that we boys could not understand. "We won't ever see him again."

But my sharp eyes had never wandered an inch from the gold-flecked giant from the moment of his second voracious rush, and to my amazement and joy I saw that he lingered for a second or two in the shallow water at the base of the bank, evidently somewhat dazed by his exertions and the fall. That brief delay marked the failure of his last opportunity, for with the swiftness of an otter on his slide I slipped down the ten feet of oozy slope. As I slid I turned sideways and when I struck the margin

one foot was planted firmly in the water on each side of the great fish. Instantly my two thumbs were slipped beneath his gill covers, and when he sensed his plight, it was too late. With hands cruelly lacerated by the sharp teeth of the gill arches, but with a happy though loud-thumping heart, I climbed the slippery bank with the struggling fish, aided by the cheering words of the old man, and by the tearful plea of my young brother. "Oh, Ed, don't let him go!" When safely on the solid ground

of the grassy meadow I carried my burden a full thirty feet back from the margin before I would lay him down. How we admired his sides of green and gold, divided into triangles and squares and rhomboids by the dark reticulating lines that mark the chain pickerel, that silvered belly whose neutral tint so aids the fish in his marvelous ability to make himself invisible at will, those greenish fins and the broad tail tipped with blotches of faint red. How carefully my brother watched, pouncing heavily upon the fish whenever a spasmodic heave of the lithe body moved it a length nearer the water! And there, fast anchored in his upper jaw, he still bore my hook.

There was no more fishing that day. The great fish and his lesser brethren were disposed on a strong withe in such manner that the length and depth of the monster was in no wise hidden, and shouldering our poles we trudged for home. Our cup was full.

We boys did not even ask

to carry the fish, a task indeed that would have forced the tail of the great one to trail in the dust. With what pride we recounted each detail of the adventure to envious admirers! Since that time, in many distant waters, larger fishes have yielded to my art, or mayhap have gone their victorious ways, but always, when fish are mentioned, that day leads all others in glory.

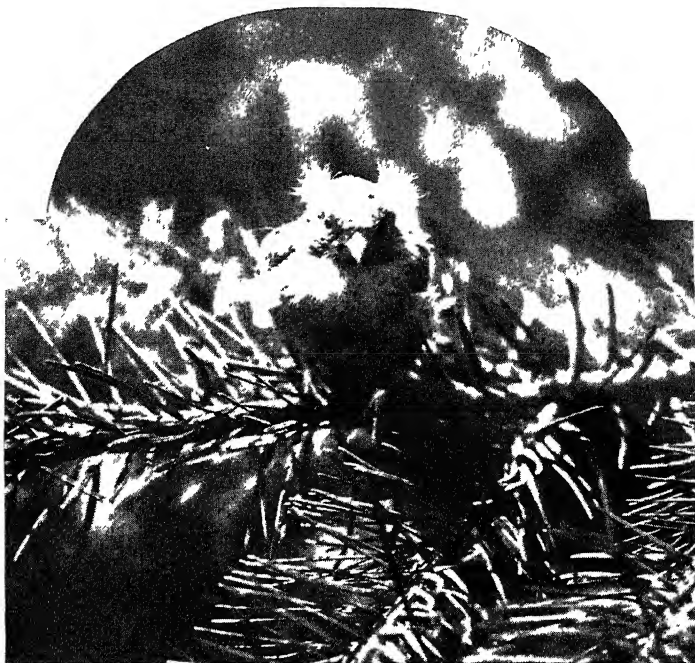


"INSTANTLY MY TWO THUMBS WERE SLIPPED BENEATH HIS GILL COVERS, AND WHEN HE SENSED HIS PLIGHT, IT WAS TOO LATE"

COLOR IN NATURE MAGAZINE

It had been hoped to return color pages to Nature Magazine with this issue but mechanical consideration incident to the complicated process of color reproduction made it impossible to make the "dead-line" so color pages will not appear until the July issue

A YOUTHFUL
GOLDFINCH
SURVEYS THE
NEW WORLD
ABOUT HIM
FROM A LIMB
NEAR HIS
ERSTWHILE
HOME



*He is grown earlier
than the waterbirds
but must spend his
first week in a gaping
helplessness*

NATURE'S PRECOCIOUS BABES

From Egg to Self-Reliant Life in Birddom

by Hamilton M. Laing

Photographs by the Author

SOME summer's day as we watch the leave-taking of a young robin from the nest on the veranda pillar and realize that twelve days previously he was but an egg, we are apt to feel that in such of Nature's children as these we see the climax of precocity. Twelve days between that blue egg-shell and the first little flight to a perch! Surely we might hand the prize to young Redbreast. But let us examine the nursery records of all of our birds and do it with the eye and patience of the naturalist, and we will find our young robin—or any other of the common perching birds, the higher types—is far from the head of the class in this matter of early intelligence. Indeed he is greatly outdistanced by the lowly water birds, the sandpipers and the grouse.

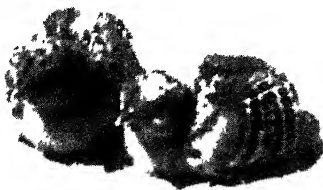
The early days of our birds always comprise one of the most fascinating chapters of their life histories. Taking the robin as a type, on account of its familiarity to all—though any perching bird is similar—we see the tiny young emerge from the pipped egg—pink, naked atoms of big-

mouthed helplessness. It is a week before they really begin to resemble birds and even when they leave the nest they bear all over them the stamp of immaturity. Contrast with this the liveliness of sandpiper, coot, grebe, duck or grouse youngling.

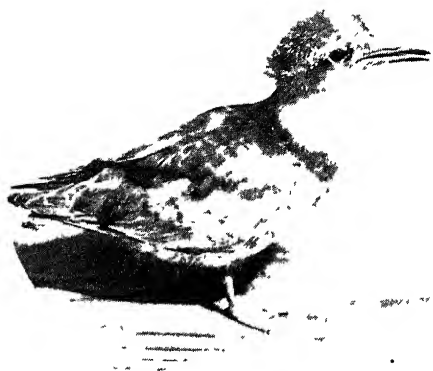
I was directed one day to the nest of a pinnated grouse in a grass plot on a prairie road through Manitoba fields. When at length I found it by flushing the mother grouse, there was one of the dozen eggs pipped. About three hours later I returned with my camera to try to get a picture of the grouse, and lo! the nest was empty except for some eggshells. Gone! No, the mother had not carried them away. They had walked. As soon as the down on their tiny bodies was dry they were ready to patter off through the grass with their parent. I quartered about the place but saw not a sign of the family though they could not have been far away.

Another warm day in early July I watched a family of sharp-tailed grouse in their first

MR LAING is a newcomer to the pages of Nature Magazine but will be intimately known to some readers since he will be the naturalist with the two Nature Magazine parties in Jasper National Park, Canada, this summer. His article, which will have successors, surely invites one to know him better.



BABY SHARP-TAILED GROUSE
*Note the early development of the wings of
the downlings*



YOUNG BLACK MARSH TERN
Soon after hatching the young swim off upon
the marsh



YOUNG ROBIN LEAVING THE NEST
The eared grebe, whose first act after hatching
was to take the shell to the water



hours in the world At 2 30 P M when the mother grouse was flushed from her nest in the grass, nine of the ten eggs were pipped Feeling that no harm could come to the young on such a day from absence of the mother, I watched the proceedings At 3 15 P M two young were hatched and three more having a violent race in getting out of the big end of their shells Half an hour later these hatched almost simultaneously By now the first two arrivals were dry and fluffy and showing a lively tendency to run off in the grass By 5 45 when I went away, hatching was almost complete though one egg was not yet pipped Yet I feel sure that had the mother been allowed to hover her young, the process would have gone forward with much greater speed.

In the dusk of evening I stole up to the nest again The mother was brooding, sitting high in the nest, hovering the downlings below her That she was there at all was probably due to a high cold wind having come suddenly That night it rained heavily—a drenching downpour and it was with great misgiving that next morning I approached the nest. It was empty—a mass of shells only Then ten feet away the mother fluttered off, pretending to be crippled, and from the spot, ten little yellow animated fuzz-balls started running in ten directions. A trifle over twelve hours old and able to run in the cold wet grass! I rushed away and hoped that the mother in a moment would call them under her breast again, and that no marauding crow or other enemy would come that way

The young ruffed grouse of the woods start out equally strong and nimble No week of naked, big-gaped helplessness for them In a day they are picking up their own food, the mother being mainly concerned not with putting food in their mouths but in leading them to the good feeding places and keeping a sharp lookout for the innumerable enemies of grouse babies—and grouse mothers too The early development of their wings is marvellous Their legs are strong within an hour after hatching, and within a week the tiny flight feathers are developing in their little wings By the time they are the size of meadowlarks they are strong fliers It is this trick that goes far to keep grouse in existence Were they unable to fly till late in their development a fox or coyote or weasel would play havoc with the covey the first time he found it.

The young of plovers and sandpipers show almost equal precocity with the grouse, but they are unable to use their wings so early Their legs are nimbleness itself almost as soon as they have kicked loose from the shell and soon they patter ceaselessly and never seem to tire The young of these birds, however, are little known to most of us as for the greater part they are hatched far north, but for types of this clan we need go no farther than the common spotted sandpiper that nests along almost every stream in America, and the killdeer plover found in almost every pasture lot

Watch the killdeer's black-spotted brown eggs as they lie in their depression—if you are clever enough to be able to find it—and like as not some day you will find them suddenly gone and four tiny toddling downy balls of gray and black and white abroad on the pasture That is, if you are again clever enough to find them Comical,

stilt-legged, big-footed midgets they are, with a wise-for-then-years gleam in their brown eyes. They know all about the tricks of hiding as soon as they are dry. It is even more interesting to see the second brood of downlings on their stilt legs as the first brood, now on the wing, joins in with parents in common cause against invasion of the kindergarten.

What we see of the tiny killdeer running off as soon as dry to find his food and hide from his foes, is true of all his kindred—the big mottled godwit or willet on the prairie, the curlew on the dry plains, or the black-bellied or golden plover of the northern tundra.

The tiny downlings of the gulls always strike me as precocious youngsters denied the right of showing what stuff they are made of by the exigencies of their early environment. They have harsh parents, they are cramped in a confining nursery, their world is cruel. For though very early after hatching, even within a day or two, they are nimble-footed, bright-witted little chaps, they are subject to the tyranny of a breeding rock that serves a whole colony where each pair of parents claims but a very limited area, and so each downling must not stray. Indeed when he does so he is liable to have his head pecked off by an unappreciative parent neighbor. I always enter a gull rookery with the greatest misgivings, for almost every invasion that causes a mix-up in the kindergarten brings direful trouble for the innocents.

This is not so true of some of the smaller gulls and of the terns. In the case of the little Franklin's gull of the interior, nesting on the plainland lakes and marshes of the north-west, I have repeatedly driven my canoe through the nursery and seen hundreds and sometimes thousands of tiny gray-brown downlings paddling off across the water. They have room to express their talents a bit. Very soon after hatching on their floating nest of rush-stems, they take to the water and more or less live on it like a duckling till the new wing quills grow to lift them aloft into their real element.

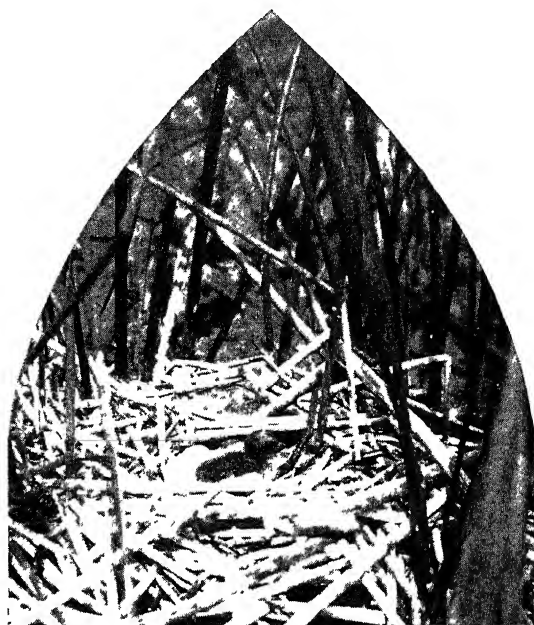
This is true also of the black marsh tern. Like the little gull, this tern allows room enough in the nursery for the young to expand. The latter take to the water and swim as naturally almost as they breathe and they are as nimble of leg in their element as the young grouse or sandpiper is ashore. No water birds of any sort, however, show the early wing development and flight precocity of the grouse chick.

It is among such water birds and others that we see the really truly clever infants. That is, early, inborn cleverness, for the young robin or goldfinch is grown up vastly earlier than any of the young of the marsh folk. But whereas the redbreast, two days old, is a complete nonentity as far as intelligence is concerned, the young grebe or coot or duckling is already master of the water, and in the case of the duckling, also at home on shore and able to find a meal for himself.

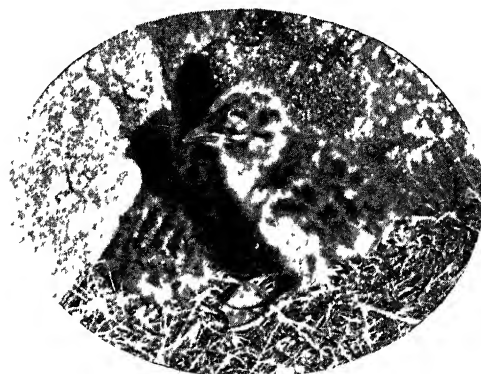
I stood one day beside a nest of an eared grebe on a Manitoba marsh and watched a case of grebe chick behavior so strange that I almost hesitate to tell of it. A friend was wading with me and when we sighted the new chick he had his head and neck thrust into the large half of the vacated shell. He was still wet, having just pulled clear of his prison. As I planted my camera



YOUNG SHARP-TAILED GROUSE
*When but the size of a sparrow he can fly with
some speed*



BABY COOT ON HIS CRADLE
*Below a glaucous-winged gull chick is nimble
about the nest at an early age*



before the nest, my assistant pulled the egg-cap off the chick. But what was this? The wet chick shuffled forward, crawling on fours like the little lizard that he was, thrust his head again into the blue-white shell-chamber and then crawled off with it. He pushed it down the little heap of soggy decaying vegetation that had been the egg-cradle and after pushing it into the water, returned to his original position. Here was an infant this hour born, ridding himself of the tell-tale egg-shell, and in another hour or two when dried into fluffy respectability below mother's warm breast, would be ready to go floating on his element and perhaps navigate under water as well.

I have never been able to learn just how early a grebe chick is master of his element. They can swim as soon as they are dry, but they do not seem to dive so naturally and it is probable that their first experience under water is often brought about by the parent. These downlings have a way of riding on the parental back and often they are carried apparently under the wing with but the head peeping out. In this position I have often seen them taken under water to be carried a few yards and liberated—and bob up to the surface like corks—the parent emerging more distantly. But no matter how they take their first dip, it is certain that within a day or two they dive as naturally as they swim—or breathe. They do not learn these things, but know instinctively—they bring the knowledge with them from the egg.

Much of the same aquatic precocity is seen in the commoner coots or "mud hens". The coot is really a very clever bird, more successful than most water birds in making a living, and a little of his keenness begins in the cradle. The mother coot, unlike the grouse, regulates the hatching of her brood so that the youngsters come along one or two a day. As soon as the tiny cootlets—beautiful black downies with scarlet trimmings—are dry they are conducted by the parents from the nest to the shelter of the rushes—their future home till they are nearly fully grown. In the matter of swimming and diving, the coot chick is as capable as the grebe, but he also has the advantage of a good pair of legs adapted to locomotion ashore. So, early in life, he climbs upon rat-houses and floating debris, and even patters on the shore in sheltered places. Again in food-finding he can show tricks to the grebelet. For though the latter must be fed by the parent till he is well along toward maturity, the young coot soon casts off from parents and

finds his own way in a world not too easy at the best.

For similar capability in juveniles we need look no farther than the geese and ducks. The hatful of ducklings or goslings hatched in the farmyard under a hen foster-mother—that knows nothing of raising such young—will patter right off with a cock-sure knowledge of the way to make a living that is splendid and comical in a week, when the harassed foster-mother is following, not leading her charges.

As soon as the downlings of the pond ducks—mallard, pintail, teal, spoonbill and such—are dry, they are lively and ready to leave the down-lined nest and follow mother through marsh and meadow or often make a long overland traverse of a quarter of a mile to reach their aquatic home. The mother is merely their leader and adviser and warden. The downlings know instinctively what to eat and where to get it, to run to water before land foe, to dive below the surface from foe of the air. When the young of the more aquatic deep-diving ducks such as canvasback, red-head or scaup have dried into a fluffy state

they are ready to toddle off the nest and paddle away on their element like grebes. Yet they are more clever than grebes as they at once find their own food. In the case of loss of mother, young ducklings of any kind do not necessarily perish as the young of other birds would, if deprived of both parents—ducklings having only a mother to guard them, of course, while most young have two parents. For in event of such tragedy these sturdy and independent little midgets either attach themselves to another brood or carry on by themselves as usual. So little is a mother necessary to duckling broods that several species have a habit of uniting two or three families into a sort of kindergarten, a single mother taking charge at a time. I have repeatedly seen over twenty downy golden-eyes escorted by a single female, and even a larger train of blackish followers behind a white-winged scoter.

For sheer hardihood of ducklings let us watch the golden-eye nest in the tree hole. Forty feet from the ground sometimes the downlings are born and then when they are ready—which, as in the case of all others of the clan, is but a matter of hours—the mother merely goes below and calls to her children and the nest-hole boils over and down they come tumbling. There is no hesitation. We might expect such a tumble to dash the life from a young and tender thing, but not so. For these are the hardest of their kind. Nor is this the com-



CANADA GOSLINGS ARE TRULY PRECOCIOUS

In ten weeks they are feathered giants with new wings that will carry them off with devoted parents

plete story For before the youngster can get from the nest, in many cases he must climb—yes, climb up the wooden walls that confine him But he is equal to it, his tiny toes and wings—which latter are as yet but fore legs—enabling him to scale the rough wall So these little fellows within the space of an hour in their first day of life, climb, tumble, run, swim and dive

In point of early cleverness the young of geese, too, are remarkable and measure up on a par with the downies of the pond ducks. But they are perhaps less capable, for they have two parents to minister to their safety, and anyone who has made a study of a nesting Canada goose knows that there are no more devoted and sagacious parents in the wild I live in hopes that some

day I will see the departure from the nest of a family of goslings hatched in the tree tops In southern British Columbia the Canadas commonly lay in old osprey nests I have seen them several times incubating a hundred feet from the ground That the little fellows tumble down, just as the golden-eyes do, is almost a certainty What nerve! What toughness in a baby is displayed here! Truly, it is a rough, even if fitting, initiation into the hard world of danger that they are starting out to face And the gosling shows the stuff in him otherwise, for in ten weeks the yellow downling will be downling no longer but a feathered giant much like his elders with new-grown wing quills that will bear him off on a maiden flight with his devoted parents

CHICKEN *a la* FUNGUS

It Makes a
Tasty Dish

by G. G. Nearing



(Right) HEN-OF-THE-WOODS IN ITS PRIME
A five pound specimen just before going into the cooking pot to make a delicious meal

(Below) JUST BARELY OUT OF THE GROUND
This plant is less than a day old and in two more days will be four pounds of tender food

WHY should a fungus be called Hen-of-the-woods? If you knew this mushroom, which masquerades in Latin as *Polyporus umbellatus*, you would see the aptness of the sobriquet, for in size, weight and general appearance it is not unlike a setting hen And although it does not have chicks, you will often find fresh specimens in the same spot for years to come

As a matter of fact, "Hen-of-the-woods" strictly belongs to a slightly different species, with irregular caps, named *Polyporus intybaceus*. But as we have no common name for *umbellatus*, we may borrow the title from the Vosges Both these varieties are a part of a family of several species which are much alike and all good to eat The barn-yard name may well take them all under its wing

Think of stepping into the woods some summer morning and picking a single mushroom that weighs five or six pounds—enough for several meals! It does not look exactly like a single one however Rather it seems to be a whole colony of little mushrooms growing on a branched stem often as fat as your two fists Yet all spring from one root by a common stem

The separate mushroom caps are not gilled beneath, but porous like a fine honey comb Cut them up together and dice the stem for cooking, unless worms have already hollowed the solid flesh. If you are an early bird you will catch the vermin napping, and enjoy a good meal at their expense

Polyporus umbellatus springs up occasionally in the shade of beech and oak trees from May until September. In favored spots it will appear every two or three weeks for many years The general color is pale gray, yellow or brown, shading into white on the almost hidden stem No poisonous fungus resembles this one in the least All that follow this peculiar system of growth are good to eat, although some species are tough. They require long slow cooking, but amply repay for the trouble.

There is another edible mushroom, *Clitocybe monadelpha*, which grows in clumps, and looks much like Hen-of-the-woods from a distance. When you pick it however you will find that it consists of separate mushrooms on long slender stems The under surface of the cap bears gills like the common mushroom



The Duped Caterpillar

by Violet Findlay

THE caterpillar that we brought home was the light green larva of the Polyphemus moth. It was found on a main street in the city of Wilmington, Delaware, by a Nature student and was taken into the schoolroom, where in solitary glory it ruled the attention of the interested students. The only receptacle handy in which to put it was a quart jar, and into this, with a leaf for company, we placed the little caterpillar.

Closely we watched it from day to day, now and then moving the jar. Soon most surprising developments took place. The larva ate little, and one day was found near the mouth of her home moving her head very slowly back and forth. The surface of the receptacle, over a limited area, became covered with minute silk threads. These were guy wires of a growing cocoon, and were fastened from the top and sides. Soon the cocoon began to take shape. We early discovered that if the caterpillar was moved as the observer turned the jar it began weaving where it happened to be, and did not return to where it had left the strand before. This interrupted manufacture of the cocoon resulted, due to our desire for experimenting, in a most fantastic arrangement as seen in the illustrations.

One side remained unfinished, and as a result of our observations, we determined that the length of time of the larva's weaving efforts depend not on completion of the cocoon, but on her supply of material. For the final shedding took place when the weaving was far from satisfactorily finished, and over night, the form of the larva assumed the shape of the pupa case, with abdominal segments, thorax, wings, and antennae all



THE WAY THE PUPA SPENT THE WINTER

The fine silk threads at the top formed the cocoon. The pupa case clings to the side of the receptacle.

It Was Led Astray
by Turning its Home

Photographs by the
Author

showing the effects of the interrupted weaving.

One wing showed a malformation due to a quick turn of the jar made by an observer. At first this case was pale green but gradually turned to a dark brown.

It will be observed that this change to the pupal stage took place outside the cocoon. Yet the larva remained in the jar all winter, in the changing temperature of a rather poorly heated room. No

effort was made to keep the pupa artificially warm.

In the spring the pupa hatched, and the moth had one deformed wing, which proved that the ultimate form of the adult is definitely determined by the first change in the autumn.

It is curious how these life stages take place even when circumstances vary from the normal. The malformations were caused by the very human desire to experiment and satisfy curiosity, but to the limit of its ability the caterpillar surmounted the difficulties it faced

and did the next best thing—which was to change into an adult outside of its usual silken covering. What would humans do, if Brobdignagians of the same proportions as man bears to the larva should attempt to thus interfere in their life processes?

It was interesting to see, however, the very narrow limits within which the caterpillar could adapt its program of change. Its habits were machine-like; they kept working in the same routine way no matter what the outside conditions were. If intelligence consists in the remoulding of habit formations to fit definite sets of circumstances, then our caterpillar had little, if any. Yet in the long run, it managed to pull through.



A QUEER PERFORMANCE OF WEAVING

Here is the jar with bottom cut away showing the guy wires and the general shape of the cocoon. Note the pupa case outside.

CURING IRIS TROUBLES

A Relatively Simple Task

by C. T. Gregory

Purdue University Agricultural Extension Department

THE LEAF BLIGHT DISEASE

Merely destroying the infected leaves prevents recurrence

CURE THIS WITH GYPSUM

The "mustard seeds" show the presence of the fungus



THE CONTROL of iris diseases and pests is a relatively simple matter. Remove all the dead leaves and cut back the tops either late in fall or early in spring.

This simple remedy will rid the plant of all its troubles except one.

A happy combination of conditions makes this possible. Consider, as an example, the common leaf blight, a disease caused by a fungus known as *Didymellina iridis*. In spring the disease first appears as more or less circular yellow spots on the leaves. As the season progresses the spots become more numerous till finally the entire leaf is brown and shrivelled down about the base of the plant. On certain varieties like Iris King, Lent A Williamson, May Queen, Mrs Beubronner, White Knight, Beethoven, Gypsy Queen, Perfection, Honorable, Blue Boy, Storm Cloud and Mary Garden the leaves may be almost completely killed. Other varieties may not be so seriously affected.

The fungus spores remain alive all winter on this rubbish

and when the new leaves push out in spring they are ready to start their destructive growth. Fortunately the fungus has no other place to live. When we destroy these old leaves

and carefully clean out these dead relics of the leaves we remove the source of this blight.

The iris borer lays its eggs on the green leaves of the plant and nearby weeds in fall. In spring these eggs hatch and the young borers work their way down, usually entering the leaves and eating their way into the rhizomes. If the tops are cut rather closely to the soil in late fall and are burned, the borer is thereby

attended to.

When a flowering stalk of the iris suddenly falls over we will usually find that the base of the stalk is soft and rotted. The common soft rot bacterium, *Bacillus caratovor-us*, is the cause. The affected tissue often has a vile odor.

Like so many other bacteria, this germ needs an insect to open the way into the root. In this case the borer is the culprit. The insect starts the trouble and the bacteria



AN INFECTED PLANT
The drooping leaves denote soft rot, one of virulent iris pests

IT MAY BE CURED
Dig up and slash the roots, to cut out the rotted part

finish it. So in cutting the tops of the plants we are killing two pests with one slash.

If, however, a plant becomes infected with the soft rot, then there is little else to do but dig up the root, cut away the rotted part, dust with sulphur and replant. If the trouble appears early in the season before the plants have flowered, it may not be desirable to dig the plant. In

such a case make a solution of Uspulun, Semesan or any of the organic mercury compounds and soak the soil about the infected root. This will probably not cure



WHAT THE LEAF BLIGHT DOES
It has spoiled many a beautiful plant before its bloom

The control of this rot consists in merely working a handful of gypsum into the soil about the affected plant. This gypsum is known chemically as calcium sulphate

the trouble but it may serve to hold it in check till after flowering time.

There is another rot of the base of the iris stalk that may be mistaken for this bacterial rot. Examine the rotted stalk. Look for tiny brown mustard-seed-like bodies on the surface of the diseased tissue. The presence of these "mustard seeds" proves that this rot is due to a fungus known as *Sclerotinia Rolfson*.

CANCER ROOT

WHILE rambling in autumn woods, did you ever come across what appeared to be a cluster of slender fir cones standing upright among the fallen leaves? And did you attempt to collect the cones, only to discover that they were all solidly attached to the roots of an oak tree? Of course, you knew something was wrong, because oaks are not cone-bearing trees, and if they were, the cones certainly wouldn't grow directly out of the roots. What, then, can these strange cones be?

The cones really belong to a separate plant known as squaw root or cancer root, a rather rare species that may be found occasionally in rich woods throughout eastern United States. It is a parasitic plant that attaches itself to the roots of trees, principally oaks, from which nourishment is absorbed. Since the object of green leaves is to manufacture food and since the squaw-root steals its nourishment, the plant has no more use for its leaves, which have degenerated through disuse into mere fleshy scales that later dry and become



A PARASITE ON AN OAK
Note the swollen condition of the oak where the squaw-root is attached

by Albert A. Hansen

brittle. It is the hardened leaves that give the cone-like aspect of squaw-root during late summer and fall. The scientific name, *Conopholis*, is a compound Greek word that means scaly cone.

The common names squaw-root and cancer root refer to the effect on the root of the host plant. At the point where the parasite is attached, the tissues of the host become enlarged, much as in human cancer. The flowers of this odd little parasite appear throughout the summer at the tip of the cone where they are partly shielded by the scales.

The squaw-root is included in a unique botanical family all members of which are root parasites. Among its relatives are such singular plants as the broom rapes, a group of weeds parasitic on the roots of flax, tomato, hemp, and tobacco, and the curious witch weed or root-bloom of South Africa, a destructive parasite on the roots of corn. Still better known, perhaps, is beech-drops, found beneath our beech trees from New Brunswick to Florida and west of the Mississippi.



COURTESY NORTHERN PACIFIC R. R.

OFF ON THE TRAIL TO GRASSHOPPER GLACIER

*Party leaving Shaw's Camp just as the members of the American Nature Association
Yellowstone Party will do this summer*

GRASSHOPPERS on ICE

Yellowstone Glacier Preserves a Well-known Pest

by William C. Alden

United States Geological Survey

JUST two days out of Cooke City, Montana, nestling in a great cirque at the head of one of the many gorges cutting into Beartooth Plateau northeast of Yellowstone Park, lies Grasshopper Glacier, where millions of grasshoppers rest in cold storage, a grim warning to their ravaging kind.

Here, 10,000 feet above the sea, in the sight of tumbling mountains, great escarpments and jewel-like lakes, the farmer can gloat his fill at the endless numbers of *Melanoplus spretus*, the devastating migratory grasshopper, entombed in a translucent mausoleum by a harsh fate. Here, too, the visitor to Yellowstone may come to marvel at the carefully preserved forms from which life departed years before during some driving mountain storm.

High up on the north flank of Iceberg Peak, within a few miles of several of its kind, is Grasshopper Glacier. From its foot starts West Rosebud Creek, to roar down the gorge it carved itself out of granitic rock until it finds the Yellowstone River. Around it on every side stretch the

grim rough-hewn peaks and profound branching canyons. Were the glacier not unusual, the setting of noble grandeur in which it rests would alone be worth the twelve mile ride from Cooke City.

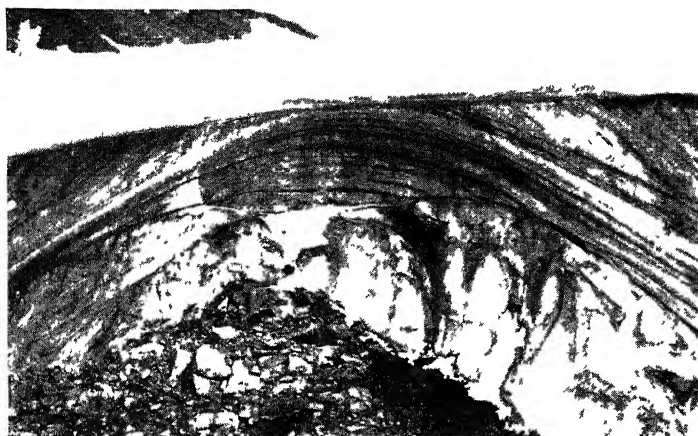
As the sun breaks over the misty peaks and filters through the pines near Cooke City—that is the witching hour we make the start for the glacier, armed with cameras, notebooks and all the paraphernalia of a geologist, and hearty lunches, prepared against vigorous appetites incited by the clear frosty air of the mountains. Cooke lies near the Montana-Wyoming State line at 7,600 foot altitude, just west of the pass where the headwaters of Soda Butte Creek and Clark Fork diverge to southwest and southeast respectively on

*Grasshopper Glacier will be one of the objectives of
one of the American Nature Association parties in the
Yellowstone this summer*

little jaunts of their own before joining the Yellowstone River. Southward rise the rugged snow-clad peaks of the Absarokas, carved from the mass of the ancient volcano which once rivalled Aetna and Vesuvius. But we faced northeast. Here the land rises gradually and spreads out



THE GOAL OF THE GLACIER VISITORS
A view of Grasshopper Glacier showing the snow covered surface and the frontal ice cliff



CLOSE-UP OF THE FRONTAL ICE CLIFF
This is seventy-five feet high and shows strata arching over an older mass of ice astride a ridge of rock



THE TRAIL ALONG NORTH GOOSE LAKE
Across the lake is the jagged, saw-tooth crest of the mountains rising 11,400 feet above the level of the sea

into a plateau. A part of this highland plain is called the Beartooth Plateau, which sweeps northeastward to the crest of an abrupt mountain front—the famous

Beartooth fault—whence it drops suddenly 4,000 to 5,000 feet to the dissected foothills. And somewhere ahead of the noses of our horses, amid the deep gashes of canyons worn down in the granite rocks by tributaries of the Yellowstone River, rests the ice-pack that is our goal.

Leaving the Ranger Station, the smelter, prospect holes and mines that hope—or did hope—to be, we climb Sheep Mountain. From its 10,700 foot summit we can look far out into the hazy distance over the plateau and down the wooded vistas of the valley of Clark Fork. Far below us lies the floor of a broad basin, sparsely wooded and dimpled with hollows scoured out of the granite by the great glaciers of the past. From one point of view we count twenty-five lakelets scattered through the woods and glittering in the sunlight. To the west the cliffs drop away into the mysterious depths of Stillwater Canyon, and beyond, to the northwest, rise the white peaks of the Snowy Range.

From Sheep Mountain, we resume our way northward, past flower-spangled grassy plots interspersed with snow banks and flecked with the shadows of scattered clumps of pine. Much of the uneven surface is bare granite whose rounded and polished ledges still show the grooves and scratches made in many places by the ponderous slow-moving glaciers of the Great Ice Age. We are nearing a center from which the Frost King deployed his glistening cohorts. One of the ancient glaciers near here once advanced more than eighty miles by way of Soda Butte, Lamar and Yellowstone valleys, to the terminal moraine below Emigrant Peak. Others crept thirty to fifty miles toward the northeast, east and southeast down Boulder, Stillwater, Rosebud, Clark Fork and other canyons, and laid their bouldery drift on the borders of the Great Plains.

The last of the dwarfed and scraggly pines at the timberline disappear, and we are at Goose Lake, among the granite peaks. To the north a jagged, saw-tooth crest, unsmoothed by glacier ice, towers high above the lake, and toward this we face, after leaving our horses to graze in the grassy plots among the snow banks. Up, up, up over a talus of loose, angular blocks, 10,000 feet above tidewater, to look northward over country whose wild beauty is equalled only by the thrill it gives. Everywhere the granite massif

is gashed and slashed with gorges whose shadowy depths drop far below the line of sight. The snowy mountain peaks rise glistening in the sun above the craggy slopes whose ravines and buttresses, cirque-scalloped walls and gloomy canyons reveal the sculpturing of frost, stream and glacier through a thousand thousand years. And at our feet lies Grasshopper Glacier—our goal.

Like a gem it huddles in its north-facing amphitheatre, about a half-mile from front to back, and a mile or more from side to side. On this day—July 14—its steeply-sloping surface is mantled smooth and white with snow, and as we descend we feel carefully ahead, lest the innocent-appearing cover break to cast us into a crevasse. At most points the lower margin of the ice is snugly pressed against a moraine or great ridge-like heap of angular frost-riven blocks of rocks transported by the glacier, but to the east, the icesheet lies astride a rising ridge of rock whose crest forms a barricade directly in front of the glittering pack, and this ledge, which faces to the south into the direct rays of the sun, has radiated sufficient heat to keep the front of the advancing glacier melted back in the form of a curving vertical cliff of ice, fifty or seventy-five feet in height. From the top of the cliff projects a beautiful but treacherous snow cornice which warns one to beware how he tarries underneath.

So this is the façade—this ice cliff—to the vast mausoleum of banded crystal where lie preserved yet harmless the remains of countless hordes of devastating insects! Here is their resting place, to which they were swept by the storm winds from the plains, after stripping the grassy plains—these enemies of man!

When the mantle of snow is off, the guide tells us, the surface of the glacier is covered with their remains. As the winds drove them helter-skelter among the peaks, the swarming clouds of insects were beaten down by hail or snow, and where they fell upon the ice, their bodies were preserved. Season after season contributed to the store. Each winters' snows buried them deeper. Thus they were entombed in bedded ice as securely as though covered with courses of masonry.

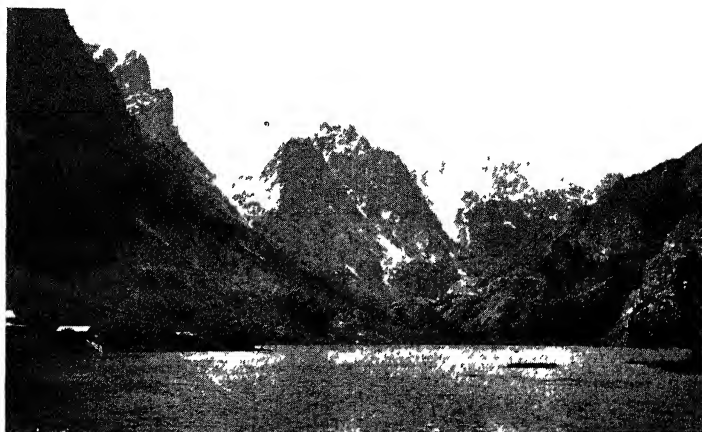
In places where the covering of snow has melted, we find a layer of dirt filled with broken wings and legs and other insect fragments, and the U. S. Bureau of Entomology, identifying the remains, explains that the forms are not extinct ones, but



GIVING AN IDEA OF PROPORTIONATE SIZE
*The crumpled beds of ice in the cliff above the glacial tarn.
Note the man in the foreground.*



IN THE MIDST OF MOUNTAIN FASTNESSES
*It was from here that the Frost King sent out his glittering
glacial cohorts on their grinding way.*



EAST ROSEBUD LAKE AND THE CANYON
*The trip to Grasshopper Glacier leads into country that every
lover of the open trail will enjoy.*

of the common migratory grasshopper, *Melanoplus spretus*. Fragments of a ground beetle of the family Carabidae are also found amid the frozen debris

Not just on the surface is the burying ground. Though efforts actually to dig out organic material from the lower part of the cliff were not wholly successful, the grasshoppers seem to be interbedded in ice from top to bottom of the glacier. Here, at last, the grasshopper is put in his proper place!

But, after all, the glacier itself is as wonderful as the insect forms it contains, and the ice-cliff as beautiful as the setting in which it lies. Rising above the mound of rock is a central mass of ice, the oldest part of the glacier, and resting upon its curved surface is a remarkable series of arching strata resembling an anticlinal fold in bedded rock. Close inspection reveals that these strata comprise two or more sets overlapping unconformably. These relations suggest a series of periods made up first of a considerable interval of melting, which reduced the glacier to a narrow central lobe with rounded surface lying astride the rock ridge, then an era of fattening by increased snowfalls, during which the glacial front advanced and overrode the curving surface of the older ice. At the time of our visit the latest surface developed by melting ice had



AND THEN THE GRASSHOPPER
Photograph of Melanoplus spretus, the same species as material gathered from the Glacier revealed

turn blood-red, then saffron, then respond to the shining brilliance of star-studded skies. Back through the pine woods, to where the campfire gleams, and odors waft from the cook cabin at the journey's end. While behind us, nestling in the crook of the arm of the mountain, lies our Grasshopper Glacier, —a mighty, ghost-like form against the slope

THE VIEW FROM THE GLACIER'S SURFACE
The rugged high country in which this fascinating phenomenon of the past is to be found by the visitor



COURTESY NORTHERN PACIFIC R. R.

been but recently covered by a mantle of clean snow. This new surface truncated the up-turned edges of the ice strata on the flanks of the fold.

A short distance to the east, or left, of the rock mound the vertical cliff merges into a steeply sloping face revealing other unconformities. To the west, the feet of the ice-cliff are immersed in a glacial lakelet filling a hollow in the rock. A view of that part of the cliff above the water shows most remarkable contortions and overthrust folds in the ice strata, caused either by lateral crowding of the ice in over-riding the central core of rock, or by unseen relations of the glacier to the hidden rock floor.

The sun drops to a glorious setting behind the gleaming ruby peaks of the Snowy Range as we ride the home-ward trail. The glacial tarns

THE FATHER AT THE NEST
The tiercel, as the male is called, after a bath and preening The female, commonly known as the falcon, is famous as a huntress



MONARCH OF THE WILD
Such peaceful contemplation was infrequent during the days the young demanded constant feeding, and raiding trips kept him busy

A BIRD of the BLOOD ROYAL

Photographing the Majestic Peregrine on English Shores

by Francis Heatherley

AS THEY swept through the sky—the big black-backed gull rapidly gaining on the smaller peregrine—I could not help but think of them as a small powerful tug pursued by a large racing yacht. I suppose that the American analogy would be a runner chased by a Coast Guard cutter. Quickly the gull overhauled the peregrine, whether falcon or tiercel I could not tell. Then, with a few strong wing-beats, it climbed high over its intended victim. Like an attacking airplane it swooped, and seemed certain to smash its prey down into the sea by its powerful onslaught. But just then, the other bird, with no intentions of serving as a meal, made some invisible side-slip, and the gull shot yards below, shrieking with rage. Again it mounted, again it was foiled, and the peregrine continued its flight unconcerned.

Even before I had witnessed this incident which so well demonstrated the peregrine's sagacity and courage I had determined to photograph the bird in its eyrie, but afterward my admiration and interest

were redoubled. I had already pictured the raven feeding its young, and my other ambition—to be the first to "shoot" the golden eagle in its home surroundings—had been frustrated by H. B. MacPherson. But this bird, a famous member of the blood royal, whose ferocity, wisdom and hunting ability had given it a large place in the history of English sport, was very much worth the effort. I knew necessary to study and picture it.

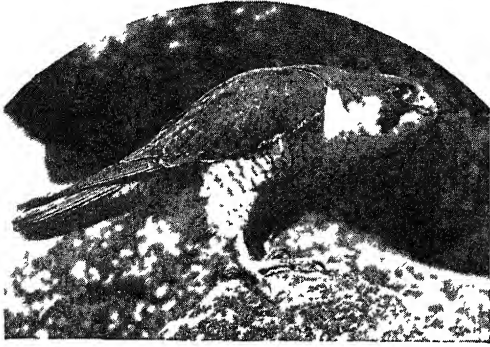
All over England I hunted for an accessible eyrie. People and peregrines have cooperated little with photographers.

The first have a tendency to collect eggs and rob nests, and most of my letters were answered with a significant line—"robbed every year by egg collectors." The second chose rugged islets and bold shores meant not for human climbing. But at last I obtained permission to use that great sanctuary for sea birds, the Scilly Islands, and after days of vigorous hunting I found my eyrie, with the help of Mr. King, the resident photographer.

It was on a rocky islet, snug against one side of a



THE YOUNG CROUCHED IN THE EYRIE
What they really care about is a fat puffin or perhaps a razor-bill auk. They're eighteen days old.



KEEPING AN EYE ON HIS FAMILY

The male stares at his brood, as if wondering how they ever got such mighty appetites



NOT SO VERY LIVELY, THANK YOU

Hardly forty-eight hours old, they show little of the adult ferociousness and courage

natural alcove formed by the rocks about twenty feet from the top of the precipice facing the sea. About four feet from the floor of the alcove it rested, for all the world like a small cage in a tiny room at the zoo. And what was more, it contained young birds, as the strange sounds we heard testified.

We passed up the opportunity to place the camera and the hiding tent directly in front of the nest, for fear the birds might desert, so erected it on the rocks above in the only place from which the camera could be trained down on the birds without disturbing them.

Then came days that tried the patience even of a Nature photographer. For several afternoons I waited, but saw more of the flies that buzzed about the eyrie than of either young or old. The young birds, paying no attention to the precept of that admirable hymn, "Work, for the Night is Coming", insisted on sleeping during the sunny hours, and I came to the conclusion that I, too, ought to spend the night in my blind to do away with the disturbing influence of my goings and comings.

At sunset, I found, the eyrie woke to life. The half-

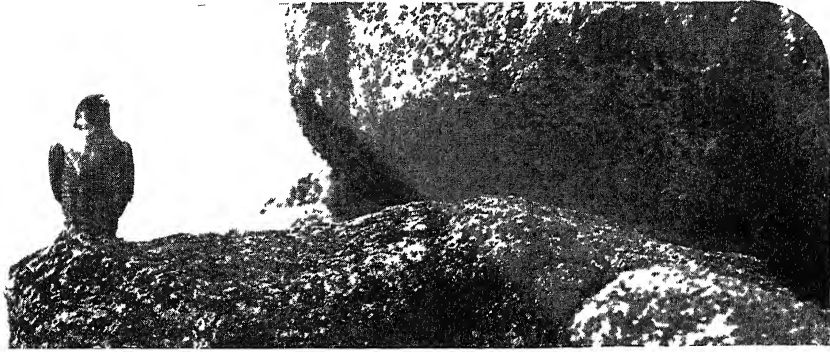
fledged young tottered about the nest whimpering for food. With their large eyes, prominent beak and downy legs, each looked like a caricature of Mr Gladstone in white cotton shorts. Just before nine o'clock all eyes turned skywards, the whimpering increased, and finally the falcon alighted on a sloping rock with a puffin in her beak. She transferred the victim to her right foot and marched down the sloping rock to a point from which she jumped down among her youngsters. What a flutter of wings! They almost hid her, and when she next bobbed up, she had the dead puffin under her talons and was tearing lumps out of it for the babies. The meal lasted fifteen minutes, and then the female climbed on a nearby rock and gazed seawards with the imperturbability of a statue. A gory feather clung to her beak, the sole evidence of her meal. Her children whimpered close to her demanding seconds, but she kept her stare fixed on the moaning sea till the long twilight ended and darkness fell.

It was just three forty-five by my watch when I was awakened by the



THE MALE SHOWS HIS WINGS

He spreads out after a bath. (Inset) the falcon broods her fourteen day old young with that patience mothers everywhere show



WITH HER EYES ON THE OPEN SEA

With steadiest gaze, the mother peregrine watched the moaning ocean as night fell, while the young whimpered in the eyrie and the photographer grew more and more cramped

sounds of a meal. The male, commonly called the tiercel, had arrived with a razor-bill. I could not see the feast, however, because the entire clan disappeared under the rocks. Another puffin arrived at five and still another at seven, but still the youngsters whimpered for more. And then the adults went away to pursue their daylight hunting, and I tried to get the cramps out of my muscles.

I made several visits similar to this night vigil, but soon I discovered that though I obtained an abundance of interesting notes, the photographs were very poor, for the birds were so far away that they appeared on the negative the size of blue-bottle flies. I decided that we must risk it and try a blind in front of the eyrie, so Mr. King had a trestle made, and the hiding tent went up, almost touching the nest.

Then more hard luck befell us. Though we had intended to leave the tent unoccupied for two days to accustom the birds to it, a series of gales kept us from landing for an entire week. By this time the young were ready to fly, and though I could see and photograph the falcon on guard on a rock not ten feet away from me while her young were still nearer, yet I took no pictures because all the meals were consumed in the extensive sub-cellar behind rocks and out of sight of my camera. So, with that patience and resignation which a photographer must have and usually acquires, I gave up for the season with the promise, "Just wait."

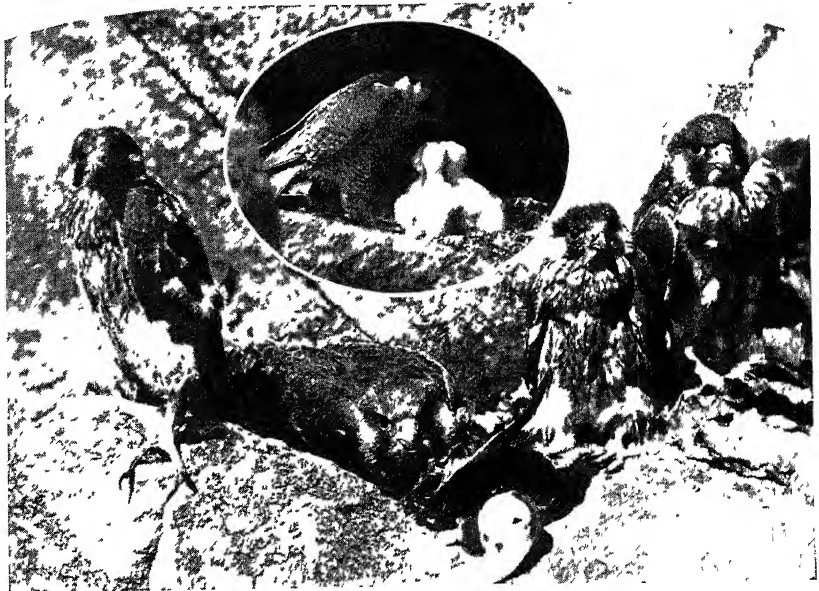
The birds had evidently disliked the canvas tent, which swayed, quivered and flapped in the wind, so I had a wooden shed made in sections during the winter, ready to place in

the same spot should news come to say that the same eyrie bore another clutch.

The glad tidings came with the spring. Mr. King wrote that he had blue-pencilled four eggs. I hastened to the Scilly Islands. But this year, as the last, was blank. By hatching time two of the eggs had disappeared, so that the two young flourished with exceeding speed, and were ready to leave the eyrie all the sooner. The shed was a success but a new photographic shutter was not. Then to make everything ideally unsatisfactory, a series of gales gave us little opportunity to land on our islet. Again the peregrines had staved off publicity and pictured fame.

The third year told a far different story. A full clutch of eggs was reported, and Mr. King and I invited several ornithological friends to join us so that the eyrie might be kept under observation day and night. For three weeks we watched, and the notes and photographs piled up.

It was well worth the days of waiting and the cramped hours in our little four-foot-square hut to watch these birds of the blood royal and their young. Others had noticed that the young differed considerably in size, and laid the cause to the fact that the eggs were not laid



ABOUT TO LEAVE HOME

A group of the young ready to try the flightways. (Inset) The father appears to be lecturing, but instead is feeding, his four day old young.

all at once. We proved, however, that the difference was sexual in nature, and could be traced back to the egg, which is about 60 grains heavier in the female.

It was all we could do to keep from rocking with laughter at times when we watched the young trying to feed. Even when newly hatched they were generally given two or three mouthfuls of feathers at the beginning of each meal—probably a sort of *apéritif*. Then usually two chicks would manage to grab opposite ends of some choice morsel and engage in a tug of war. Once we saw a female but four days old receive the entire leg of a thrush which, after manifold struggles, she settled down to digest with the claws and an inch of the tarsus still outside her mouth. Two hours later there were no portions visible except when she gaped.

The prize incident of all occurred one day when the tiercel, as was his custom, was yapping at the young to take the food. I accidentally knocked over a tobacco tin, and the proud father stopped, with open beak, to listen. The youngster, spying what he thought was a succulent morsel, darted into his parent's mouth, seized his tongue and did his best to pull it out, while the pained paterfamilias flapped his wings and shrieked dire imprecations. Finally, after dragging the resisting

youngster all over the eyrie, he managed to get loose. One would have expected the bird version of the local wood-shed to be then dramatized, but no—the meal was quietly resumed.

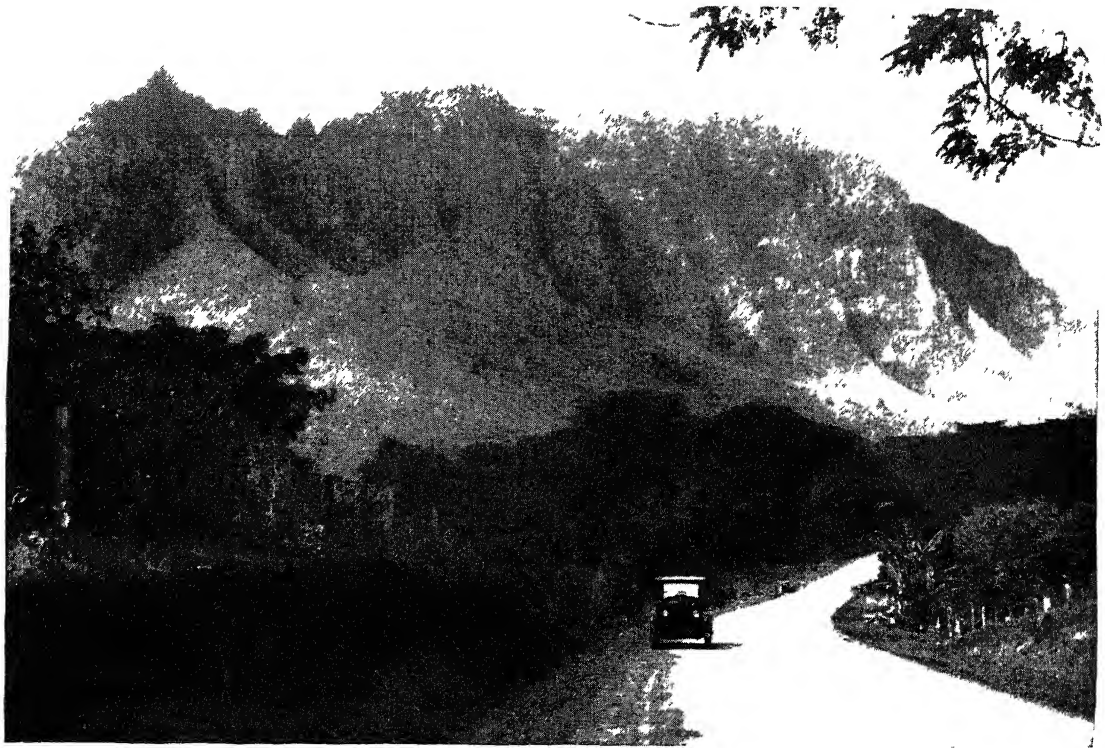
It had taken three years to study my peregrine, but it was worth it, and I felt pangs of regret when I finally took leave of these ferocious birds, so unsuspecting of the way their portraits were to be spread abroad. I wondered how long the eyrie would be left in peace if it were placed anywhere but on the Scilly Islands, where they have a way of really defending rare birds' eggs. Genuine British eggs are worth five pounds a clutch in the market, and many are the collectors. Then, too, the peregrine, despite its proud history, belongs to that aristocracy of the avian host, the birds of prey, who receive none too adequate protection in the British Isles. It often fares the fate of the stoat and the hawks of all kinds who are killed because their presence will ruin the day's drives. But bird values are undergoing re-adjustment and the time is approaching when the sight of a pair of buzzards, wheeling on high with outstretched wings, will be considered worth many a young rabbit. And then the peregrine will probably come back to its own place, won after centuries of serving lovers of sport.



HISTORIC GREAT FALLS OF THE POTOMAC

HAROLD GRAY

A close-up of the Virginian falls, which clearly shows how vital to its beauty is the heavy flow of water a power company is seeking to divert against the people's wishes



NO BILLBOARDS TO MAR THIS LANDSCAPE
*Kamehameha Highway on the Island of Oahu, one of the hundreds
 of miles of paved motor highways, all free of outdoor advertising*

BILLBOARDLESS HAWAII

Where a True Value Is Placed on Natural Beauty

by John Edwin Hogg

SOME years ago much of the incomparable scenic beauty of the Hawaiian Islands began to do what the scenery of other regions has done and is still doing. It was disappearing behind an ever-increasing number of garish billboards which interrupted lovely vistas of mountain, turquoise sea, and tropical vegetation. The erection of billboards in Hawaii progressed to the point where a group of women known as The Outdoor Circle began to get "huhu" (angry) about it. Today there isn't a billboard on the Island of Oahu, the island on which Honolulu is located, and to the writer's knowledge, there isn't a billboard on any other island of the Hawaiian archipelago.

The purging of Hawaii of billboards came about as the majority of orderly and permanent reforms are accomplished, by the creation of a majority public sentiment in favor of billboard elimination. And, as in the case of other reforms, things had to get too bad for public toleration before steps were taken to make them better. Just as the fraudulent and money-grabbing practices of certain food and drug dealers gave us a Federal food and drug law, and as the evils of the old-time liquor industry brought about the prohibition experi-

ment, Hawaii got rid of billboards when those unsightly structures fell from public grace. The story of how all this came about is not only interesting, but one from which other regions afflicted with billboard eyesores may draw some valuable observation.

The billboard business in the islands was legitimate and prosperous until about 1922. Billboards had begun to crowd out quite a bit of scenic beauty, but the billboard advertisers were convinced that billboards did help them sell goods, and nobody other than the good ladies of The Outdoor Circle seemed to be particularly interested in the preservation of Hawaii's natural grandeur. The Outdoor Circle began to make considerable "noise" about the desecration of the islands by unsightly billboards, but at that time the organization did not represent any power sufficient to make its protests effective. The number of billboards steadily increased, and so did the membership of The Outdoor Circle.

Before the digging of the Waikiki reclamation canal took the water off of a large portion of what is now known as the Waikiki section of Honolulu, much of that region was a vast salt marsh, commonly known as "The Duck Pond". A representative of a food products

manufacturer got his eye upon it. To him it was a dandy place for a huge billboard, because tens of thousands of people passed by it every day in motor cars or on street cars. A tremendous billboard straightway made its appearance on piling in the middle of the marsh. This was the beginning of the end for all billboards in Hawaii.

The ladies of The Outdoor Circle, by that time greatly augmented by the strength of increased numbers, arose in righteous wrath. They announced through the press that they would not patronize the products sold by billboard advertisers. They pressed their campaign so vigorously that billboard advertisers began to find their billboard advertising detrimental to their business interests. A wholesale pulling down of billboards and cancellation of billboard advertising space immediately followed.

At that time practically all the billboard advertising in the Hawaiian Islands was in the hands of a single firm, The Pioneer Advertising Service. So, the ladies of the Outdoor Circle took up a public subscription, and purchased the Pioneer Advertising Service entire. The terms of the sale, however, were that the business was to be junked, and that the former owners who sold out agreed not to re-engage in the billboard business—at least, not in the Hawaiian Islands. Simultaneously, notices were sent to mainland American and foreign advertisers to the effect that all billboard advertised

products stood little chance in Hawaii. Today, a billboard advertisement would be tantamount to a public notice that the purchase of goods so advertised is "tabu." Still there is no law against billboard advertising in Hawaii, although there is a well defined public sentiment against it, which is law enough.

After having sunk the billboard issue so deep that no one dares attempt its resurrection, the women of the Outdoor Circle turned their attention to the cultivation of Hawaii's natural scenic beauty. They have since planted out tens of thousands of coconut trees, hibiscus plants, oleanders, pink and yellow shower trees, poncianas, and such, which now bloom over every landscape. Wherever one would normally expect a billboard to be there is usually a bower of flowers, or a blaze of floral color framed against coconut palms, and with the

blue sea or the vivid green of the mountains beyond.

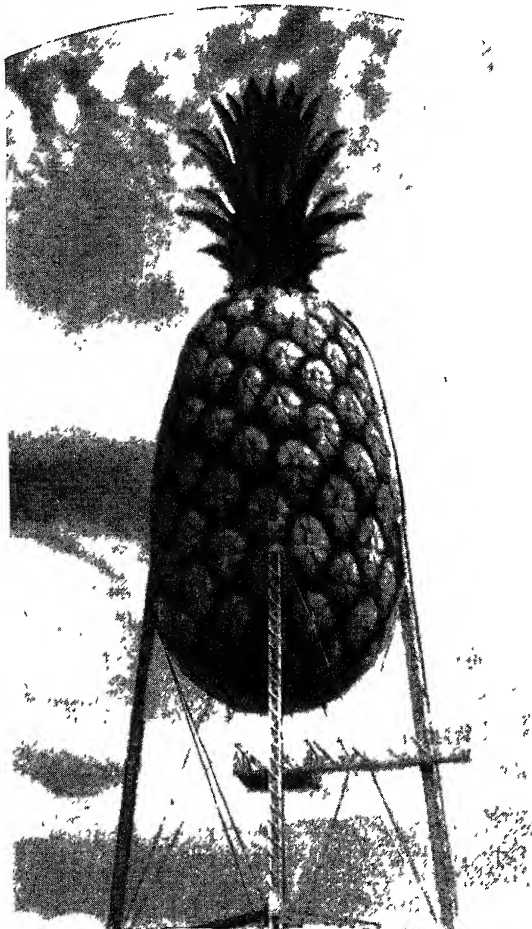
Aside from sugar and pineapples, the two major industries of the islands, Hawaii's third industry is that of catering to tourists. According to the figures of the Hawaii Tourist Bureau—somewhat conservative—Hawaii's tourist business last year was worth \$10,000,000. The connection between tourists and billboards—or the lack of billboards—is not readily apparent. California is literally disfigured with billboards

and all sorts of unsightly advertising schemes carried on out of doors. Yet California has an annual tourist business that dwarfs Hawaii's by comparison. But California is on the mainland of the United States, while Hawaii stands all alone away out in the middle of the Pacific Ocean.

Hawaii might be festooned with billboards, and all the billboards that could be assembled wouldn't bring a tourist from overseas. A group of Hawaiian Islands plastered with billboards might create a little local business but it would be nothing compared with the value of the tourist patronage. Climate and natural beauty, plus an assortment of volcanoes, and other strange things, constitute Hawaii's sources of tourist attraction. Billboards could add nothing, but would detract much from those attractions.

Innumerable Hawaiian business enterprises, whose owners have been interviewed by the writer, have experienced no decline of

business in any way attributable to the lack of billboard advertising mediums. Those businesses are now advertised in the newspapers, by street car cards, and direct mail campaigns. Business men declare that such advertising, which offends no one, brings in the business, and that they have no desire to return to the old regime of attempting to out-advertise their competitors by the purchase of billboard space even though possible. They recognize that Hawaii's lack of billboards is one of the lachrystrings hanging out to the tourist from overseas. A few billboards probably wouldn't do any serious damage to Hawaii's tourist trade, any more than billboards keep tourists out of Southern California. But, the Honolulu business man is inclined to believe that billboards are an imposition upon tourists and local residents alike, and will have none of them. It is



THE NEAREST THING TO A HAWAIIAN BILLBOARD
A water tank disguised as a pineapple making a symbolic and pleasing effect



A SPOT THAT WOULD MAKE AN EXCELLENT BILLBOARD SITE
It is one of many spots in Hawaii but no billboard will be erected upon any of them because it would not pay

better business for him to open his purse to a solicitation for funds for a few more flowering trees, coconut palms, or other additions to Hawaii's beauty and attractiveness to the tourist

Time was when business houses in Honolulu painted their names across the sides of their buildings in glaring-hued letters twenty feet high. Today there isn't a sign of the sort in Hawaii. Business firms vie with each other in the creation of establishments that are dignified and attractive in appearance. The best shops

look more like banks or city offices than they do places of retail trade. Gold leaf letters on plate glass usually announce the name of the firm and the kind of business in which it is engaged. Some outside signs are used in the business districts of Honolulu, but the vast majority of them are small and inconspicuous compared with the garish signs one sees in nearly every other American city. A few small electric signs are used, and some painted or enameled signs are floodlighted at night. But, on the whole, it may be said that Honolulu's entire scheme

HAWAII HAS SELECTED THESE SUBSTITUTES FOR BILLBOARDS
Thousands of flowering trees, hibiscus and coconut palms have been set out to add to beauty instead of destroying it

